LG TRAINING CENTER

1080P
Direct View LCD

LG
Life's Good

42LH50 Direct View LCD

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OUTLINE

Section 1

Contact Information, Preliminary Matters, Specifications,
LCD Overview, General Troubleshooting Steps,
Signal Distribution, Disassembly Instructions and Voltages

Section 2

Circuit Board Operation, Troubleshooting of :

- Switch mode Power Supply/Ballast Combination

New
- Main Board Internet Connection
- Ft Control Board
- Side Keys

42LH50 LCD Direct View Display

Section 1

This Section will cover Contact Information and remind the Technician of Important Safety Precautions for the Customers Safety as well as the Technician and the Equipment.

Basic Troubleshooting Techniques which can save time and money sometimes can be overlooked. These techniques will also be presented.

This Section will get the Technician familiar with the Disassembly, Identification and Layout of the LCD Display Panel.

At the end of this Section the Technician should be able to Identify the Circuit Boards and have the ability and knowledge necessary to safely remove and replace any Circuit Board or Assembly.

IMPORTANT SAFETY NOTICE

The information in this training manual is intended for use by persons possessing an adequate background in electrical equipment, electronic devices, and mechanical systems. In any attempt to repair a major Product, personal injury and property damage can result. The manufacturer or seller maintains no liability for the interpretation of this information, nor can it assume any liability in conjunction with its use. When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Electronics. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury. If wires, screws, clips, straps, nuts, or washers used to complete a ground path are removed for service, they must be returned to their original positions and properly fastened.

CAUTION

To avoid personal injury, disconnect the power before servicing this product. If electrical power is required for diagnosis or test purposes, disconnect the power immediately after performing the necessary checks. Also be aware that many household products present a weight hazard. At least two people should be involved in the installation or servicing of such devices. Failure to consider the weight of an product could result in physical injury.

ESD Notice (Electrostatic Static Discharge)

Today's sophisticated electronics are electrostatic discharge (ESD) sensitive. ESD can weaken or damage the electronics in a manner that renders them inoperative or reduces the time until their next failure. Connect an ESD wrist strap to a ground connection point or unpainted metal in the product. Alternatively, you can touch your finger repeatedly to a ground connection point or unpainted metal in the product. Before removing a replacement part from its package, touch the anti-static bag to a ground connection point or unpainted metal in the product. Handle the electronic control assembly by its edges only. When repackaging a failed electronic control assembly in an anti-static bag, observe these same precautions.

Regulatory Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and the receiver; Connect the equipment to an outlet on a different circuit than that to which the receiver is connected; or consult the dealer or an experienced radio/TV technician for help.

CONTACT INFORMATION

Customer Service (and Part Sales)	**(800) 243-0000**
Technical Support (and Part Sales)	**(800) 847-7597**
USA Website (GCSC)	**aic.lgservice.com**
Customer Service Website	**us.lgservice.com**
LG Web Training	**lge.webex.com**
LG CS Academy	**lgcsacademy.com**

http://136.166.4.200

LCD-DV:	**32LG40, 32LH30, 42LG60, 42LG70, 42LH20, 42LH40, 42LH50, 47LG90**
PLASMA:	**42PG20, 42PQ20, 42PQ30, 50PG20, 50PS80, 50PS60**

Also available on the Plasma page

Plasma Panel Alignment Handbook

New Training Materials on the Learning Academy site

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Safety and Handling Regulations

1. Approximately 20 minute pre-run time is required before any adjustments are performed.
2. Voltage levels on SMPS are factory adjusted and sealed. VR301 and VR302.
3. Be cautious of electric shock from the Backlight section, it uses high voltage AC. Check that the Power Supply and Drive Circuits are completely discharged because of residual current stored before Circuit Board removal.
4. C-MOS circuits are sensitive to static electricity, use caution when dealing with Circuit boards. Always handle the circuit boards on the outside edges, while wearing a static wrist strap.
5. Exercise care when making voltage and waveform checks to prevent damaging the unit and service equipment.
6. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.

Checking Points to be Considered

1. Check the appearance of the Replacement Panel and Circuit Boards for both physical damage and part number accuracy.
2. Check the model label. Verify model names and board model matches.
3. Check details of defective condition and history. Example: Oscillator failure dead set, etc…

Basic Troubleshooting Steps

Define, Localize, Isolate and Correct

•**Define** Look at the symptom carefully and determine what circuits could be causing the failure. Use your senses Sight, Smell, Touch and Hearing. Look for burned parts and check for possible overheated components. Capacitors will sometimes leak dielectric material and give off a distinct odor. Frequency of power supplies will change with the load, or listen for relay closing etc. Observation of the front Power LED may give some clues.

•**Localize** After carefully checking the symptom and determining the circuits to be checked and after giving a thorough examination using your senses the first check should always be the DC Supply Voltages to those circuits under test. Always confirm the supplies are not only the proper level but be sure they are noise free. If the supplies are missing check the resistance for possible short circuits.

•**Isolate** To further isolate the failure, check for the proper waveforms with the Oscilloscope to make a final determination of the failure. Look for correct Amplitude Phasing and Timing of the signals also check for the proper Duty Cycle of the signals. Sometimes “glitches” or “road bumps” will be an indication of an imminent failure.

•**Correct** The final step is to correct the problem. Be careful of ESD and make sure to check the DC Supplies for proper levels. Make all necessary adjustments and lastly always perform a Safety AC Leakage Test before returning the product back to the Customer.

42LH50 Product Information

This section of the manual will discuss the specifications of the 42LH50 LCD Direct View Display Panel.

Key Features

- LG NetCast™ Entertainment Access*
- (Netflix®, YouTube™, Yahoo!® Widgets,
- My Media Access CIFS)
- TruMotion 120Hz
- Full HD 1080p HD Resolution
- 70,000:1 Dynamic Contrast Ratio
- 2.7ms Response Time (GTG)
- 500 cd/m2 Brightness
- Wide Color Gamut
- Super IPS Panel
- Wide Viewing Angle
- XD Engine®
- 24p Real Cinema
- ISFccc® Ready
- Picture Wizard
- AV Mode II (Cinema, Sports, Game)
- 60,000 Hour Panel Life (typical)
- NTSC/ATSC Tuners with Clear QAM

Pixel Count to Resolution Comparisons

720P Logo

720P Panel

768

HD RESOLUTION 720p HD Resolution Pixels: 1365 (H) × 768 (V)
High definition television is the highest performance segment of the DTV system used in the US. It's a wide screen, high-resolution video image, coupled with multi-channel, compact-disc quality sound.

	FORMATS		
NTSC	480I	Interlaced	240 Lines
SD	480P	Progressive	480 Lines
HD	1080I	Interlaced	540 Lines
HD	720P	Progressive	720 Lines
HD	1080P	Progressive	1080 Lines

BASIC PIXEL COUNTS

720P Panel
1365 (H) × 768 (V)

1080P Panel
1920 (H) x 1080 (V)

Possible Frame Rates:	Interlaced 2 Fields to make a Frame
24FPS 30FPS	Progressive
60FPS	Each Field is a Frame

Think of sync as the Panels "Refresh Rate"

Basic Specifications (LOGO Familiarization)

Full HD 1080p Resolution
Displays HDTV programs in full 1920 x 1080p resolution for a more detailed picture.

Remote Control Familiarization

TOP PORTION

BOTTOM PORTION

Accessing the Service Menu

REMOTE BOTTOM PORTION

To access the Service Menu.

1) Turn the Set On
2) Simultaneously, Press and "Hold" the Menu Key on the Side Key pad and Press and "Hold" the Menu Key on the Remote approximately 5 seconds.
3) If Customer's Menu appears, continue to hold until it disappears.
4) The Service Menu appears

Note: If a Password is required to enter the Service Menu. Enter; **0000**

SIDE KEYS

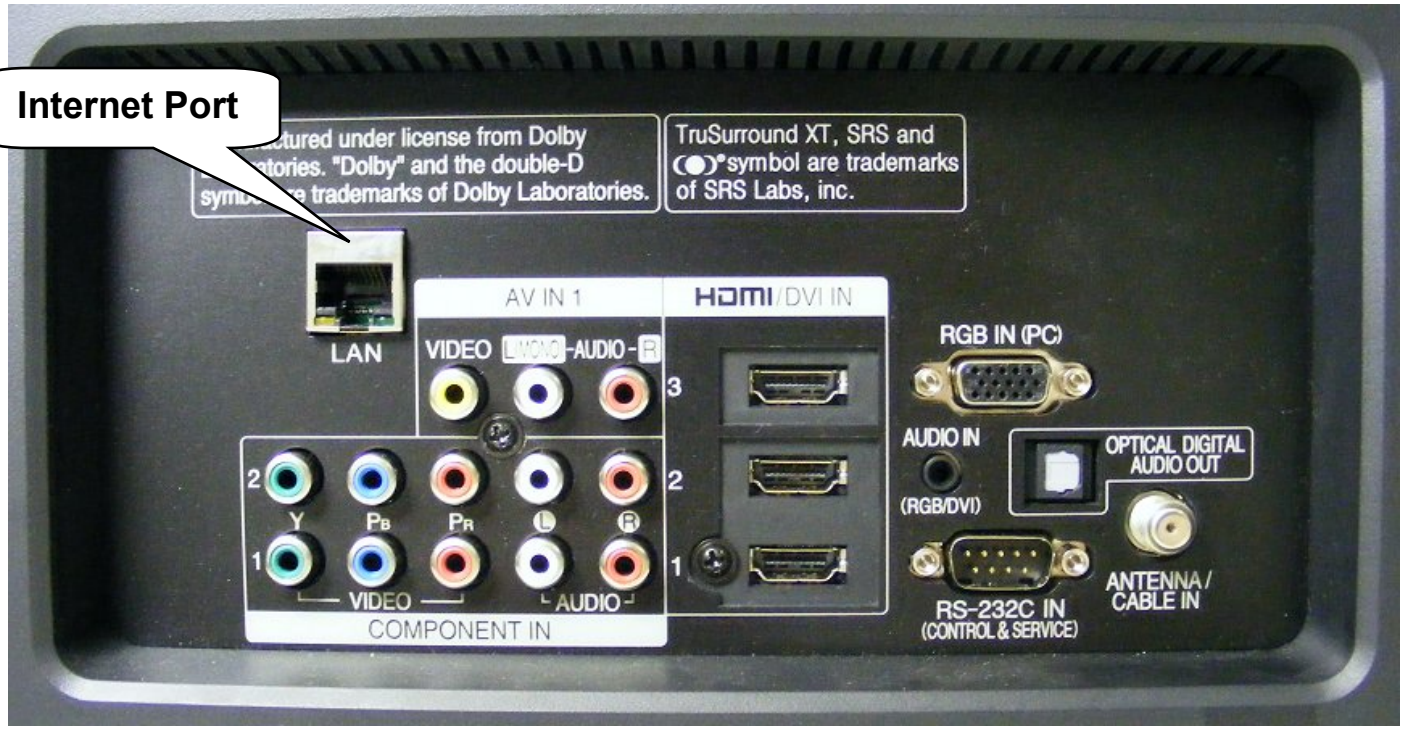
Rear and Side Input Jacks

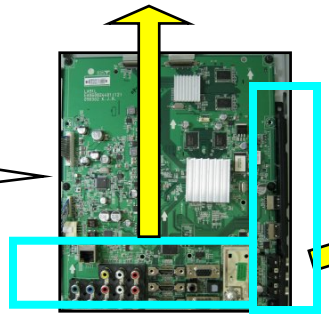
Side In/Out

USB Port
Software Upgrades
Music, Photos

Rear In/Out Jacks

Internet Port

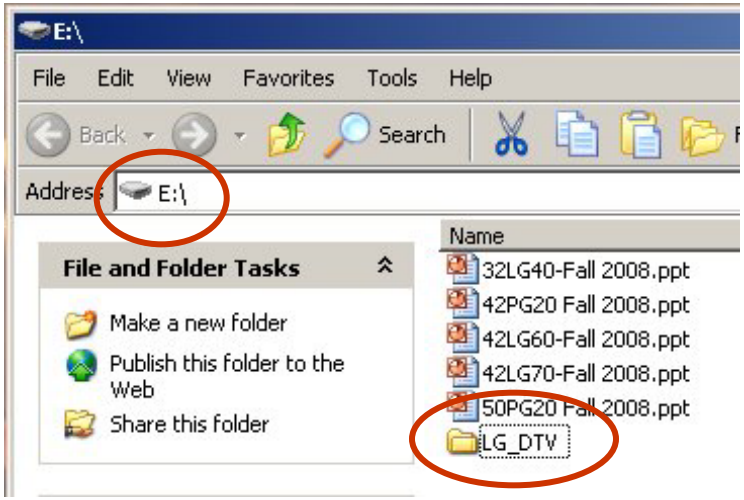




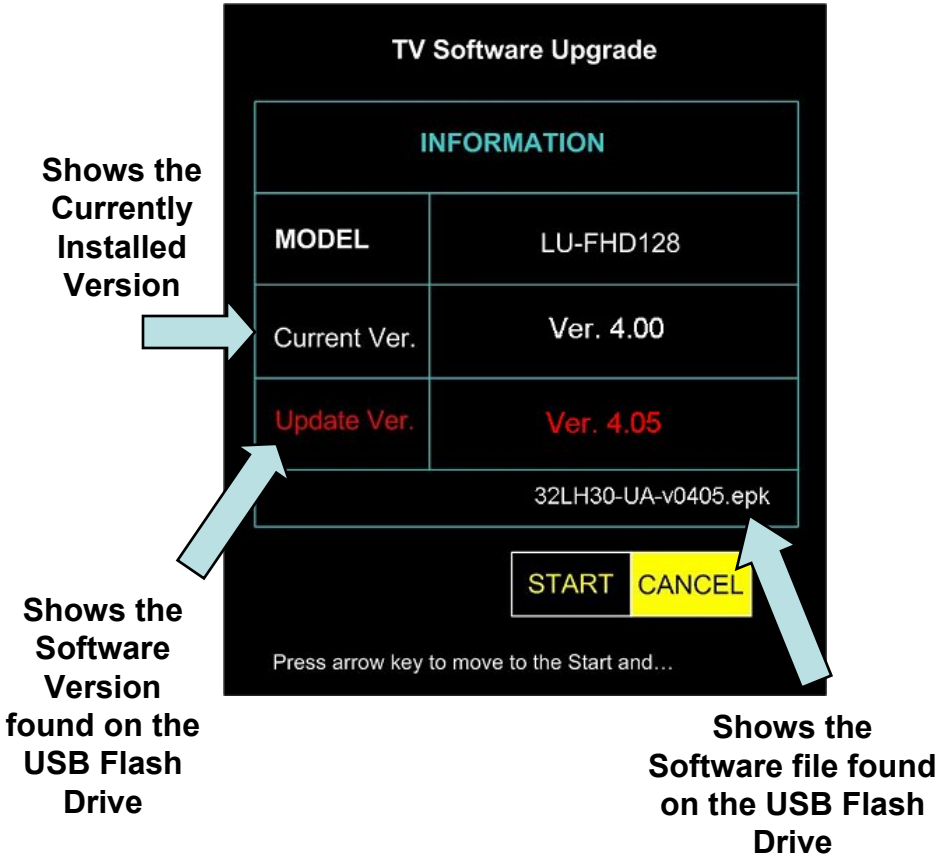
MAIN PWB
Rear and Side
Input/Output locations

USB DOWNLOAD

1) Create an LG_DTV folder on the USB Flash Drive

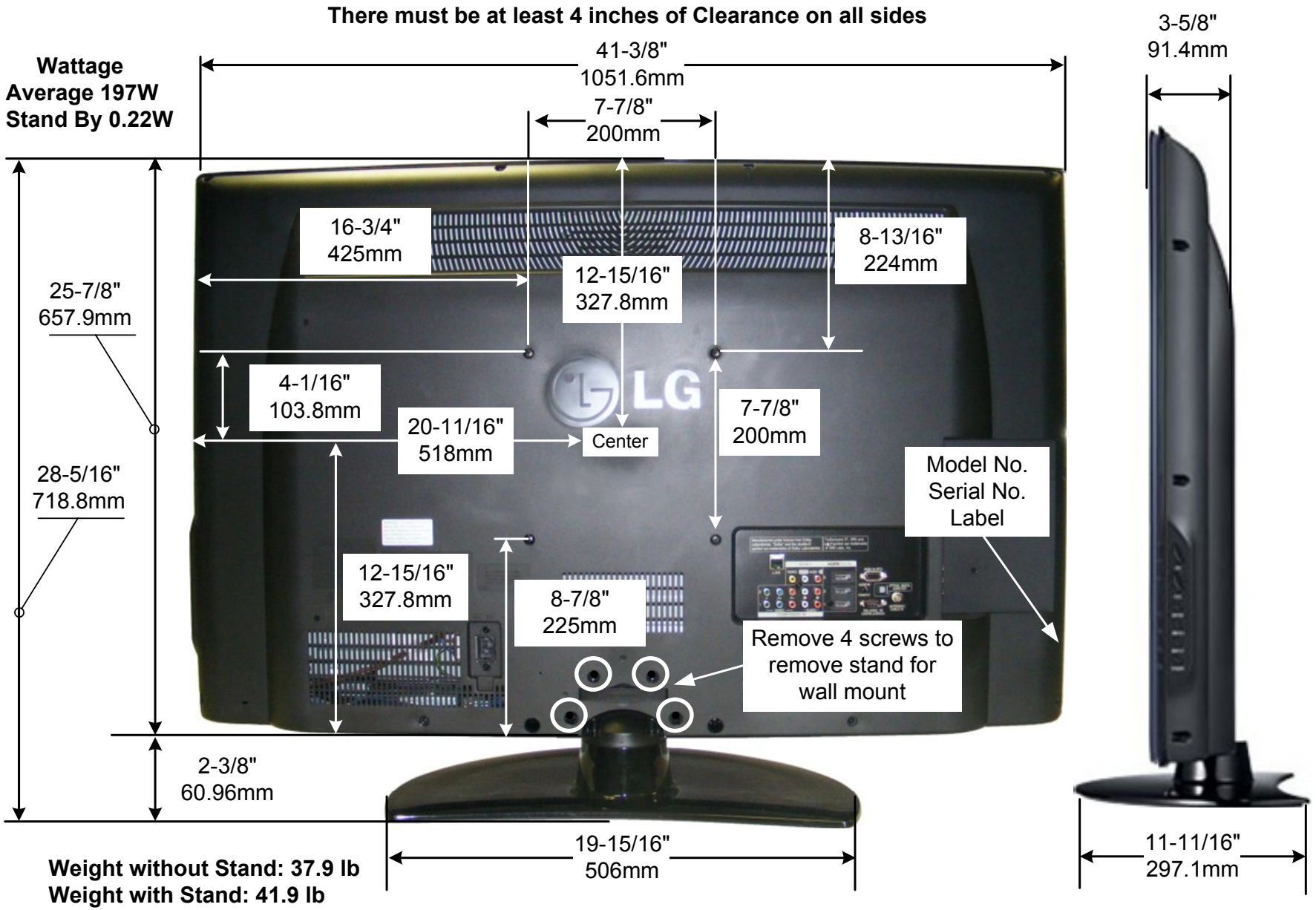


2) Copy new software (xxx.epk) to "LG_DTV" folder. Make sure to have correct software file.
3) With TV turned on, insert USB flash drive.
4) You can see the message "TV Software Upgrade" (See figure to right)
5) Cursor left and highlight "START" Button and push "Enter" button using the remote control.
6) You can see the download progress Bar.
7) Do not unplug until unit has automatically restarted.
8) When download is completed, you will see "COMPLETE".
9) Your TV will be restarted automatically.



*** CAUTION:**
Do not remove AC power or the USB Flash Drive.
Do not turn off Power, during the upgrade process.

42LH50 PRODUCT DIMENSIONS



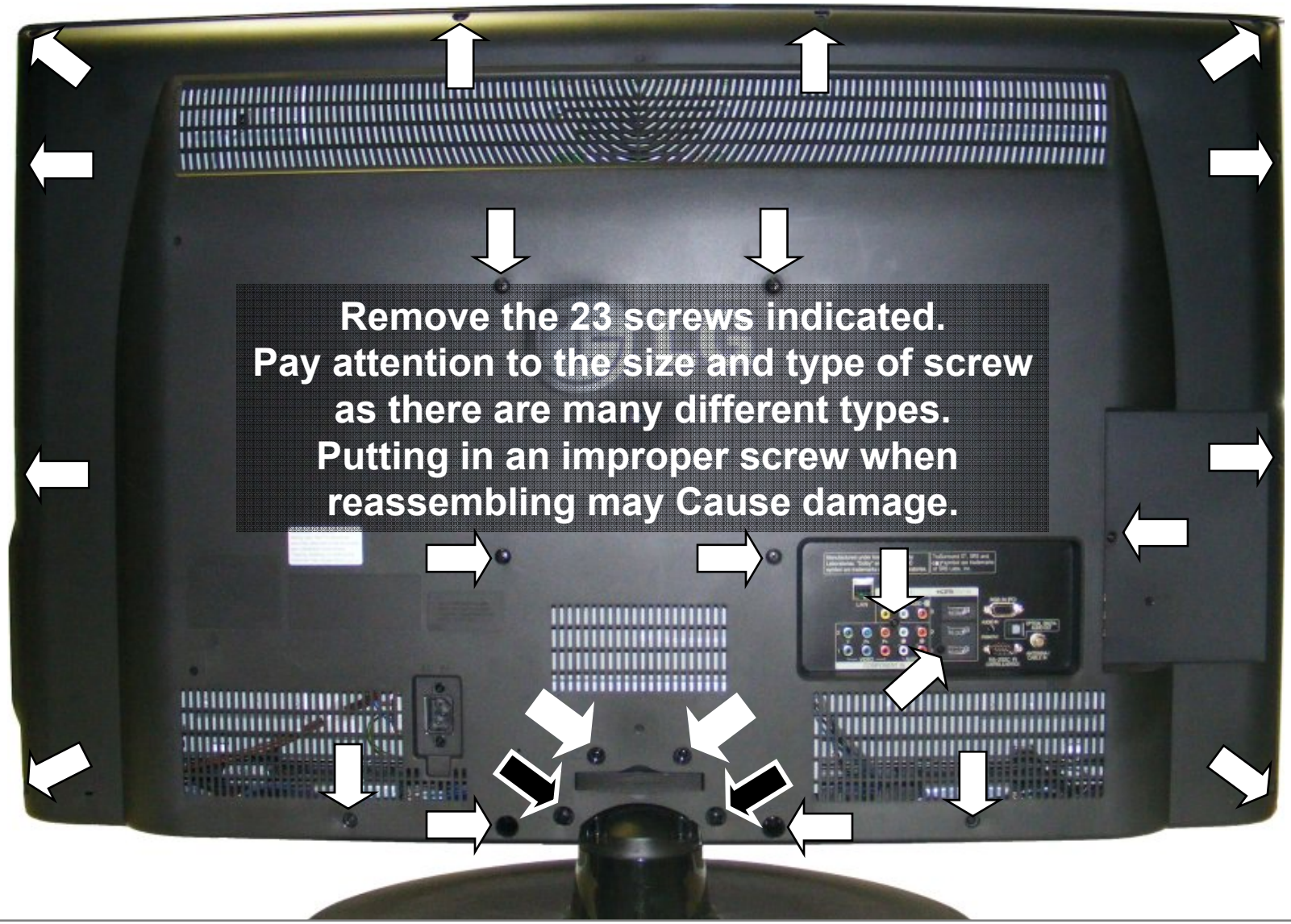
Disassembly:
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 42LH50 LCD Direct View Television.

Upon completion of this section the Technician will have a better understanding of the disassembly procedures, the layout of the printed circuit boards and be able to identify each board.

Troubleshooting:
This section of the manual will also discuss troubleshooting.

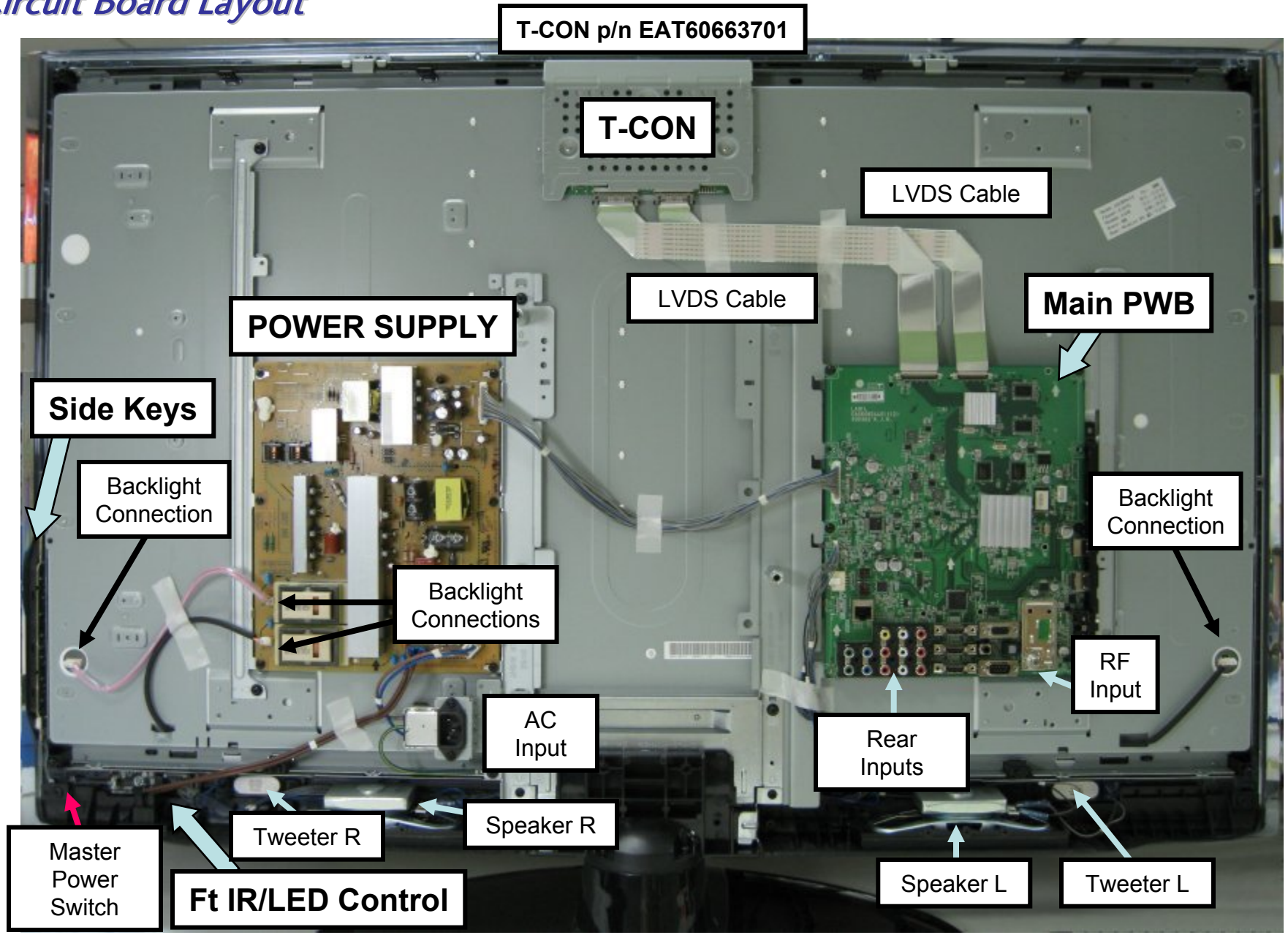
Upon completion of this section the Technician will have a better understanding of how to diagnosis and resolve problems.

Removing the Back Cover


Remove the 23 screws indicated.
Pay attention to the size and type of screw as there are many different types.
Putting in an improper screw when reassembling may Cause damage.

The Stand and its bottom two screws do not need to be removed before removing the back.

Circuit Board Layout

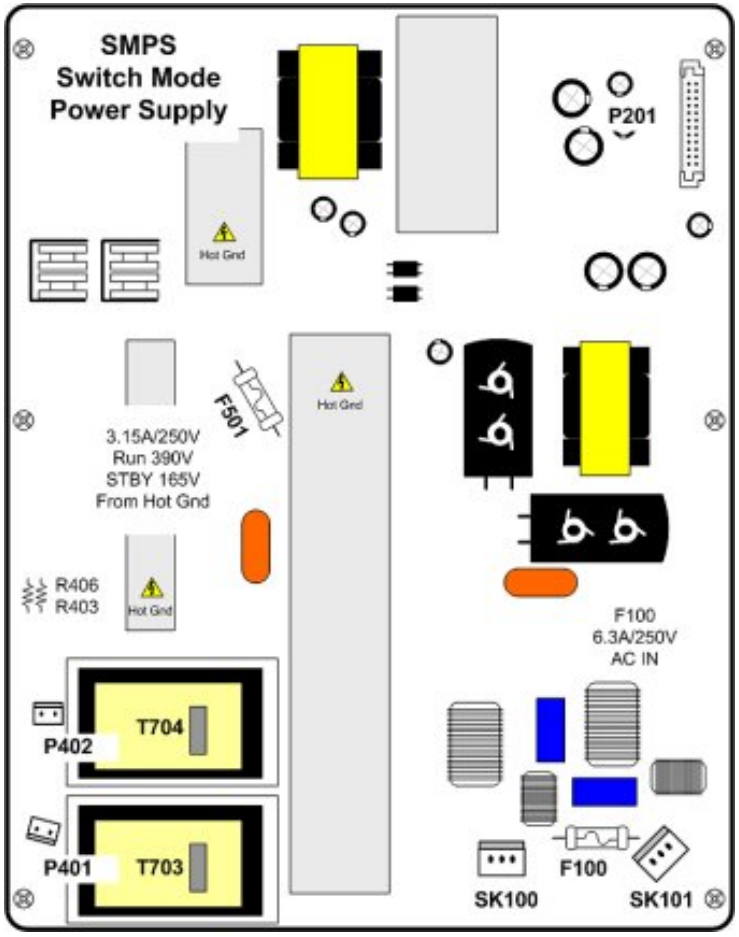


POWER SUPPLY SECTION

Note: If the Master Power Switch is off, this power supply is completely off.

This switch mode power supply has the ballast section built in.
The power supply develops Stand By 5V, 12V and 24V for the Main board.

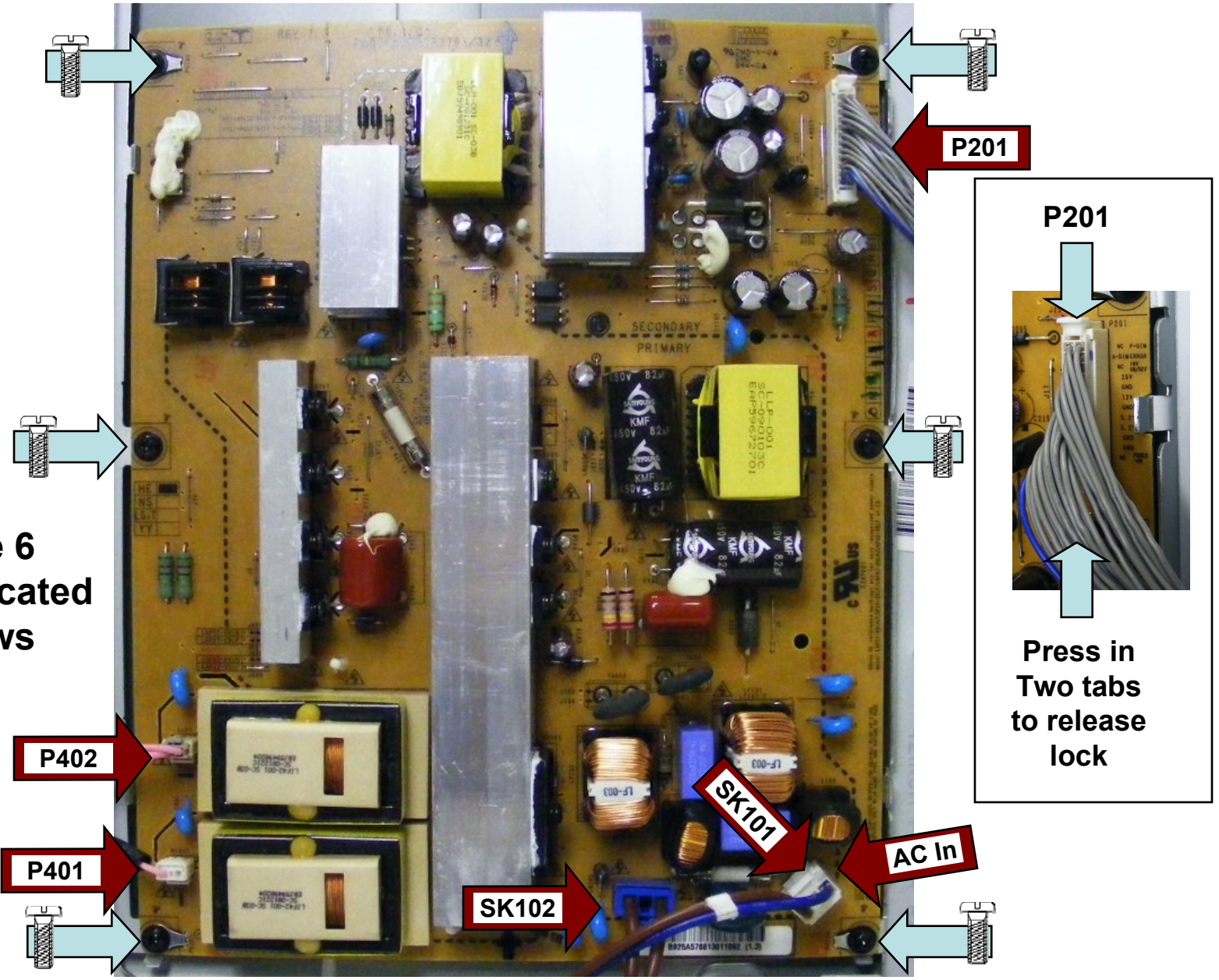
This power supply draws a little less that 1 watt during stand by mode. The fuse F501 reads 73VDC (from hot ground) during this time. When the controller chip (on the back) receives the PWR-ON command via P201 Pin 19, the primary section increases its current supplying ability. The Primary fuse F501 now reads 390V.
12V is routed out P201 pins 5 and 6 and
24V is routed out P201 pins 1 and 2.
Internally, the power supply also sends B+ (390V) voltage to the Ballast section but it is not turned on at this time.
When the power supply receives the INV-ON command via P201 pin 20, it is routed to the driver for the ballast (on the back of the board). The driver now starts to deliver drive information to the output FETs (on the far left hand heat sink) which in turn switch the primary sides of the two ballast transformers T703 and T704. They output 1.2Kv (48Khz) pulses to the backlights via P401 and P402.



Power Supply PWB Removal

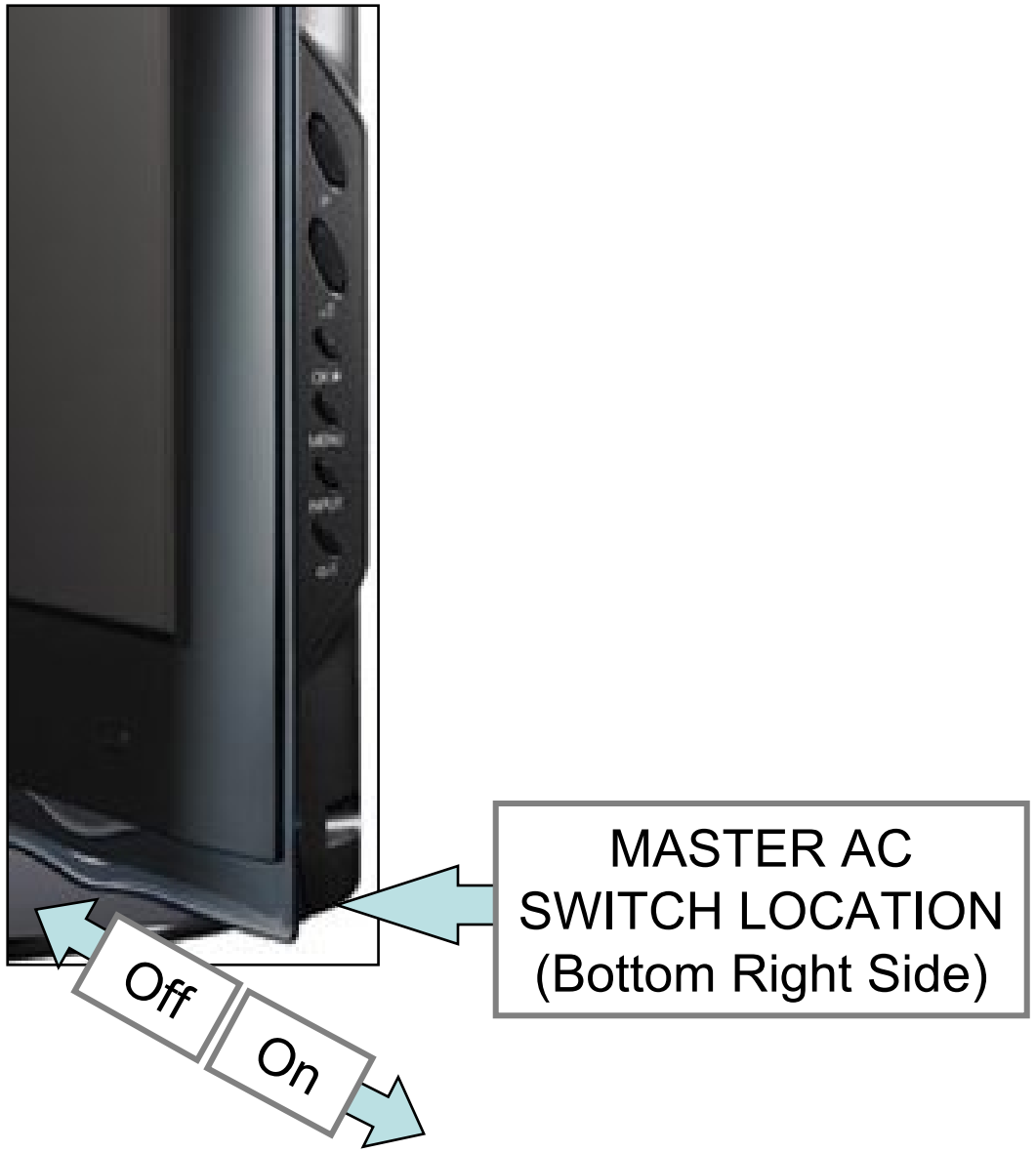
Disconnect P201, P401, P402, AC In SK101 and SK102.

Remove the 6 screws indicated by the arrows w/screw.

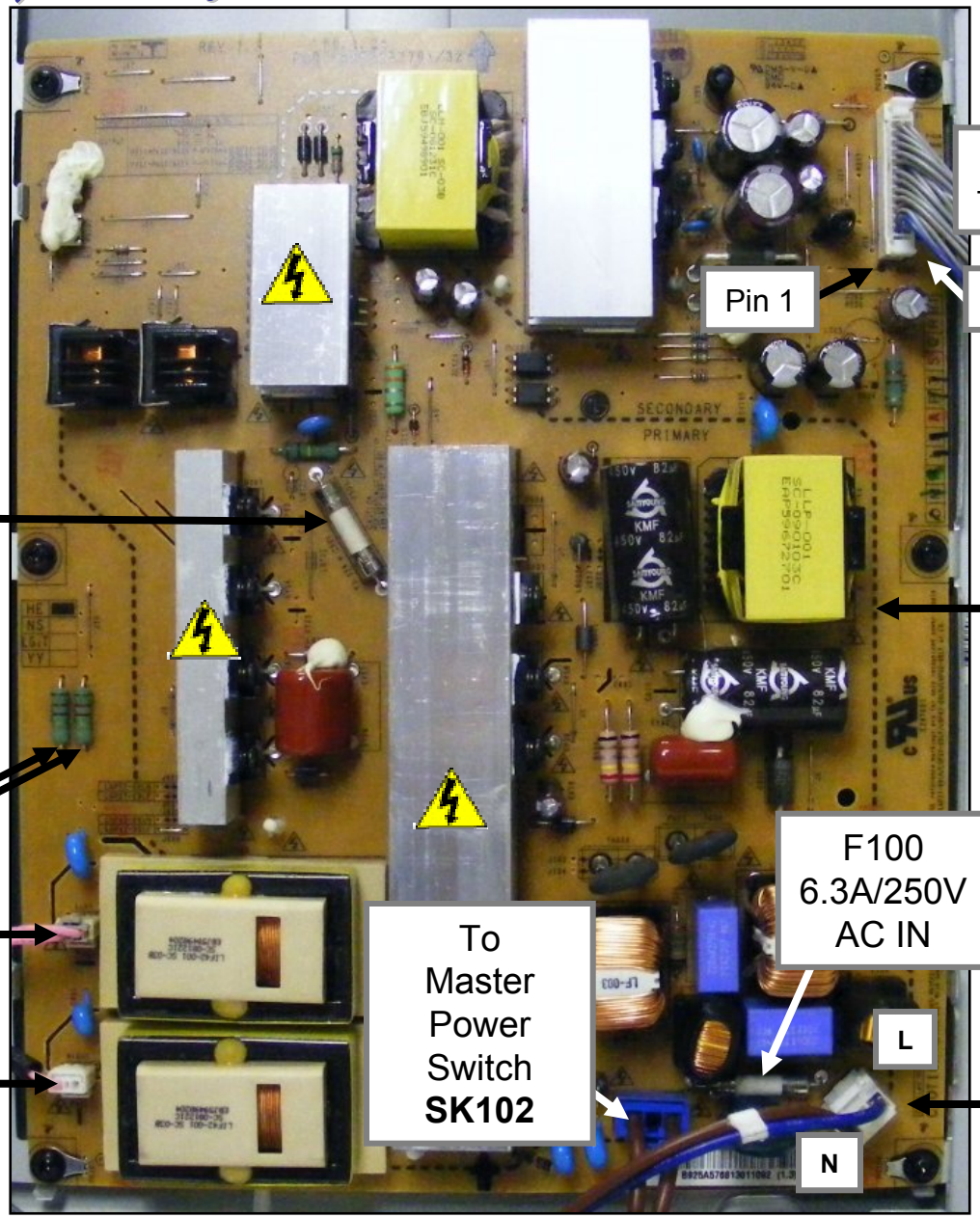


Power Supply (Master Power Switch) Location

If the TV won't come on, be sure to check the Master Power Switch before assuming a failure has occurred.



Power Supply (SMPS) PWB Layout



Hot Ground
Shock Hazard

F501
3.15A/250V
Run 390V
STBY 165V
From Hot Gnd

TP for checking backlight drive signals

To Backlights Left Side P402

To Backlights Right Side P401

To Master Power Switch **SK102**

P201
To Main

Pin 1

Pin 2

Components inside the dashed line are referenced to Hot Gnd

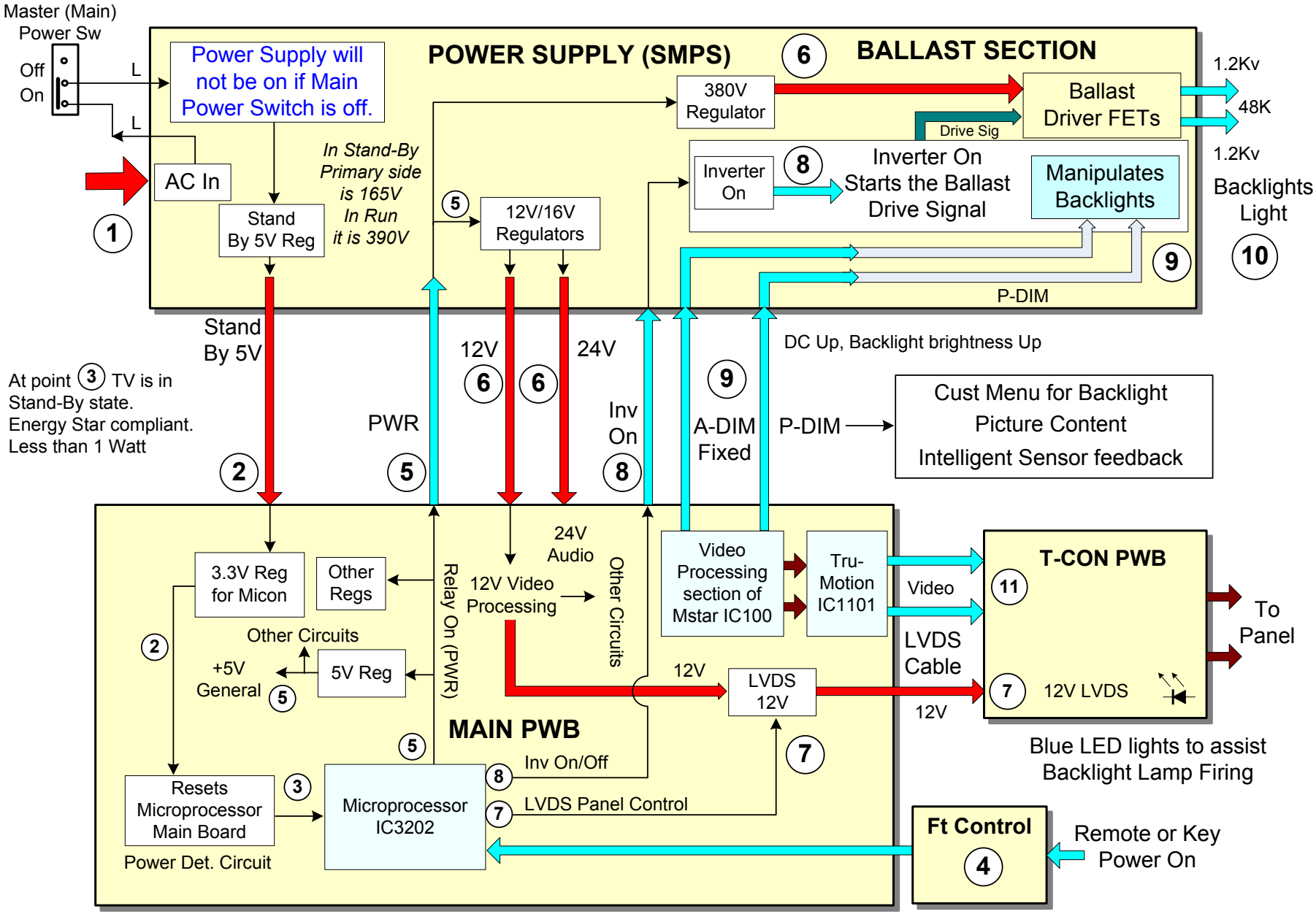
F100
6.3A/250V
AC IN

L

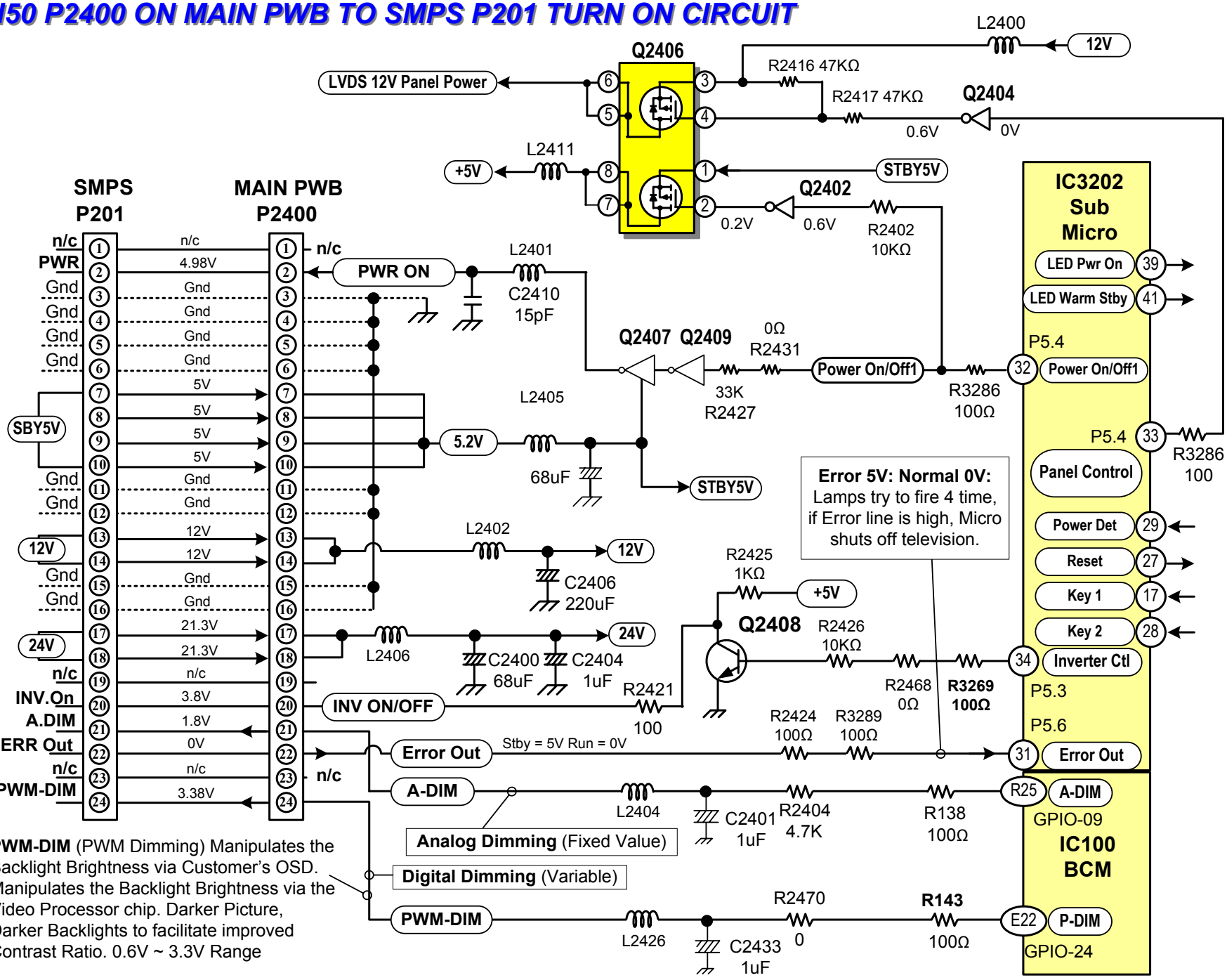
N

AC IN SK101

42LH50 POWER SUPPLY TURN ON COMMANDS FROM MAIN PWB



42LH50 P2400 ON MAIN PWB TO SMPS P201 TURN ON CIRCUIT



TEST 1 Power Supply PWB Low Voltage Test

AC Should not be applied at any time while adding resistors or while unplugging connectors as damage to the circuit PWB may occur.

a) The SMPS PWB "MUST" be producing STBY 5V on all of the pins 7, 8, 9 or 10 (5V).

If 5V Standby is not being generated, the SMPS PWB is defective and must be replaced. There is no need to continue with the next test.

(b) Unplug P2400 on the Main PWB.

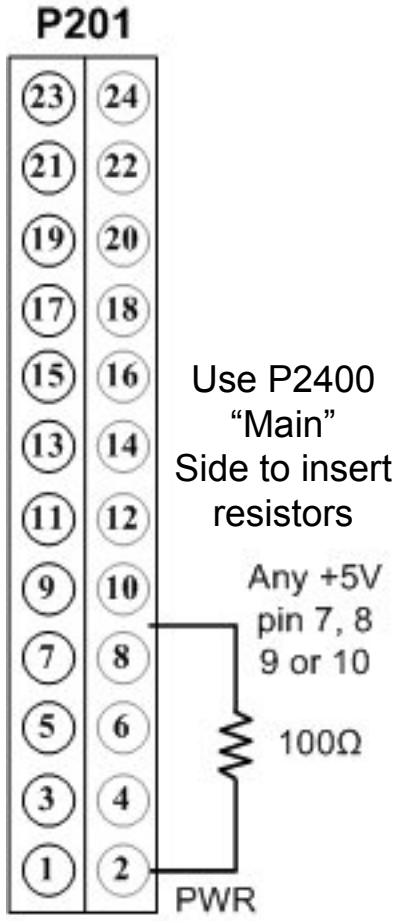
TEST 1:

(1) Add a 100Ω resistor between (5V STBY) pin 7, 8, 9 or 10 and Pin 2 (PWR). Apply AC. This will turn on the power supply.

a) **Check that the 24V and 12V power supplies are turned on,**

- **P201 (24V pins 17 and 18)**
- **P201 (12V pins 13 and 14)**

(2) Remove AC power.



TEST 2 Power Supply PWB Backlights Test

P2400 Connector disconnected from the Main PWB. Apply AC after adding jumper.

Continue if the 1st test was OK. Leave original resistor in place.

(3) Add another 100Ω resistor between (5V) pin 7, 8, 9 or 10 and Pin 20 (INV On).

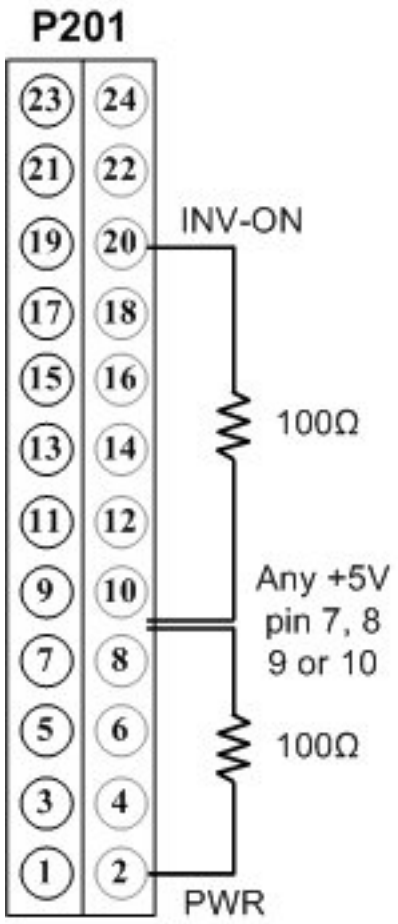
(4) Apply AC Power. Simulating a Power and Backlight On command.

Backlights Normal:
a) If normal, the backlights should turn on. SMPS OK.

Backlights Abnormal:
a) Recheck all connections.
b) Confirm the INV On/Off line pulling up to at least 3V.

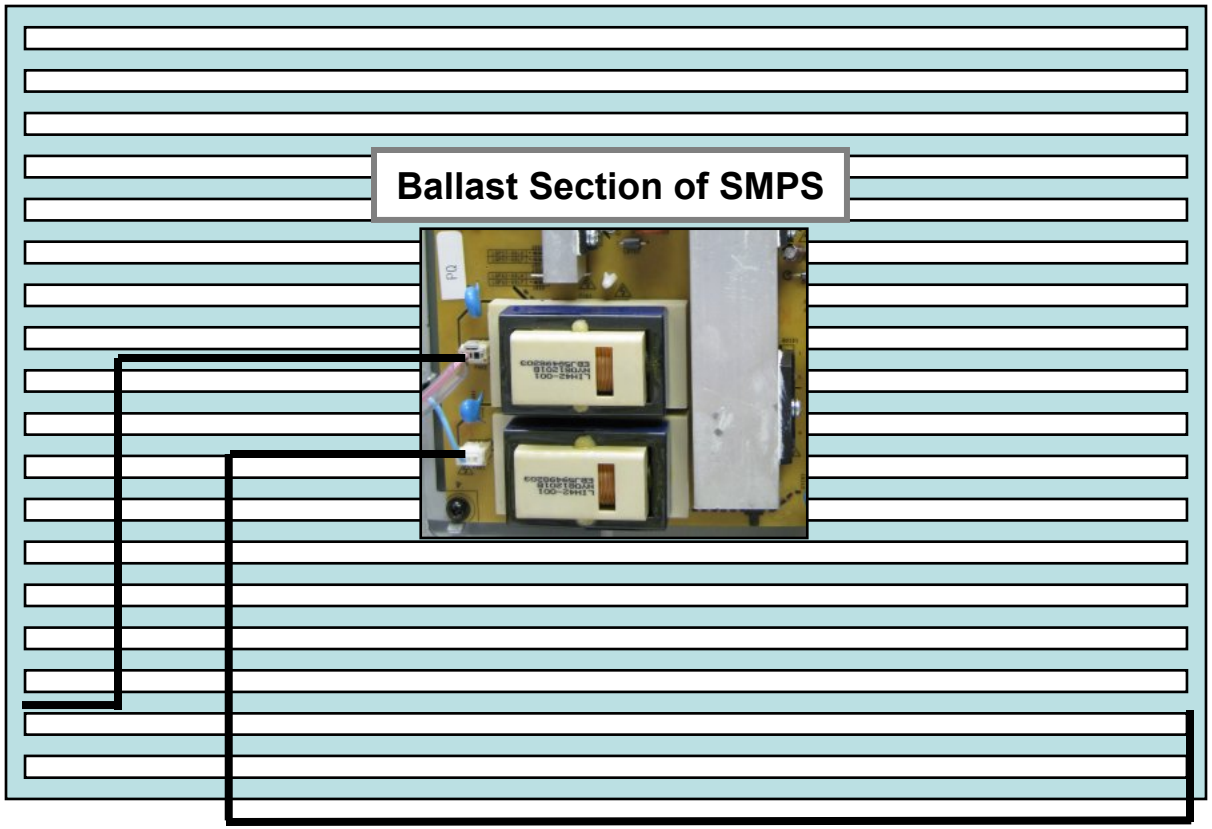
REMOVE AC POWER:
c) Check the connections to the Backlights.
DO NOT check these when AC is applied as they carry 1.2Kv each.

Note, either of the connections are unplugged, the backlights will not light.



Use P2400 “Main” Side to insert resistors

General Backlight Information

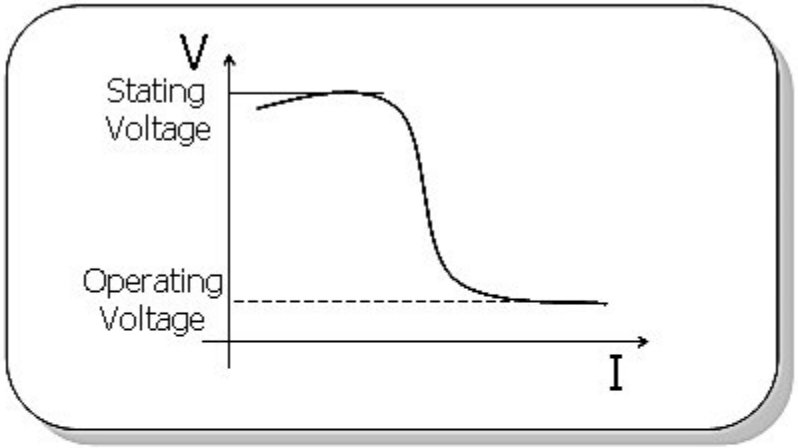


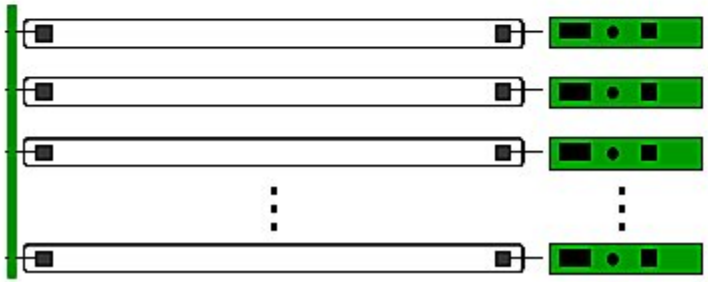
EEFL (External Electrode Fluorescent Lamp)
LOW COST Large number of lamps driven by a single inverter

Introducing EEFL

Simple structure, Low price

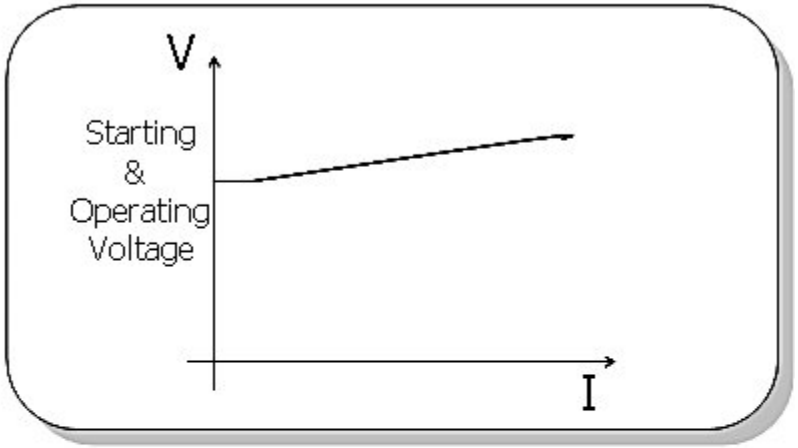
CCFL (Cold Cathode Fluorescent Lamp)

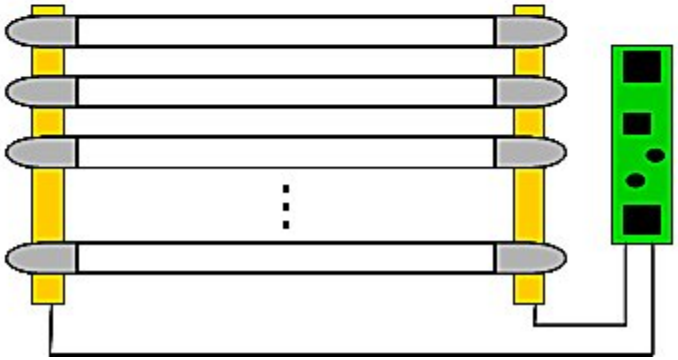




Complicated structure

EEFL (External Electrode Fluorescent Lamp)





Simple structure

Lamp manufacturing process
Lamp assembly structure

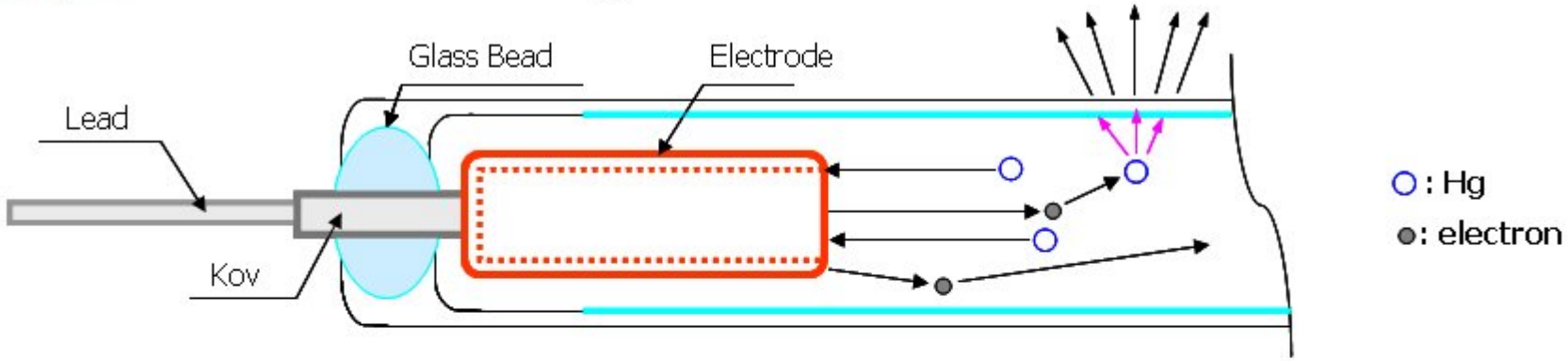
Low Cost

Large number of Lamp
Drive by single inverter

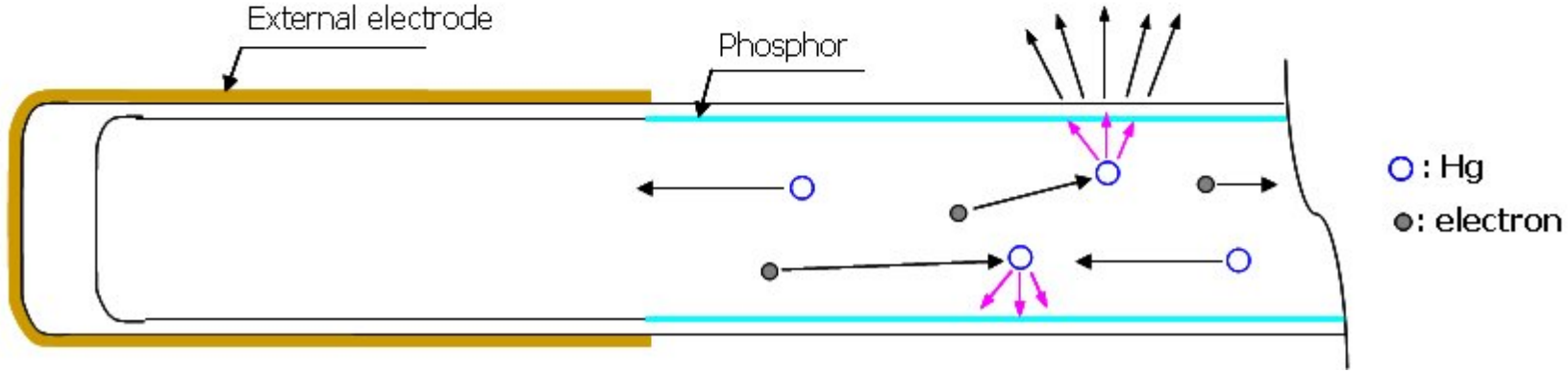
Introducing EEFL Contacts (Bulb Design)

Key: Long Life Time

CCFL (Cold Cathode Fluorescent Lamp)



EEFL (External Electrode Fluorescent Lamp)

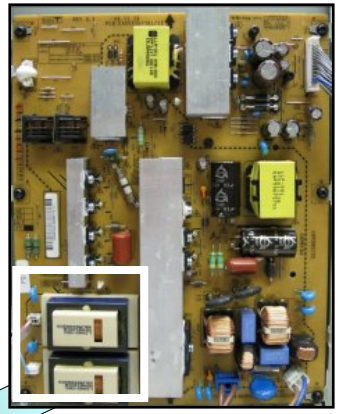


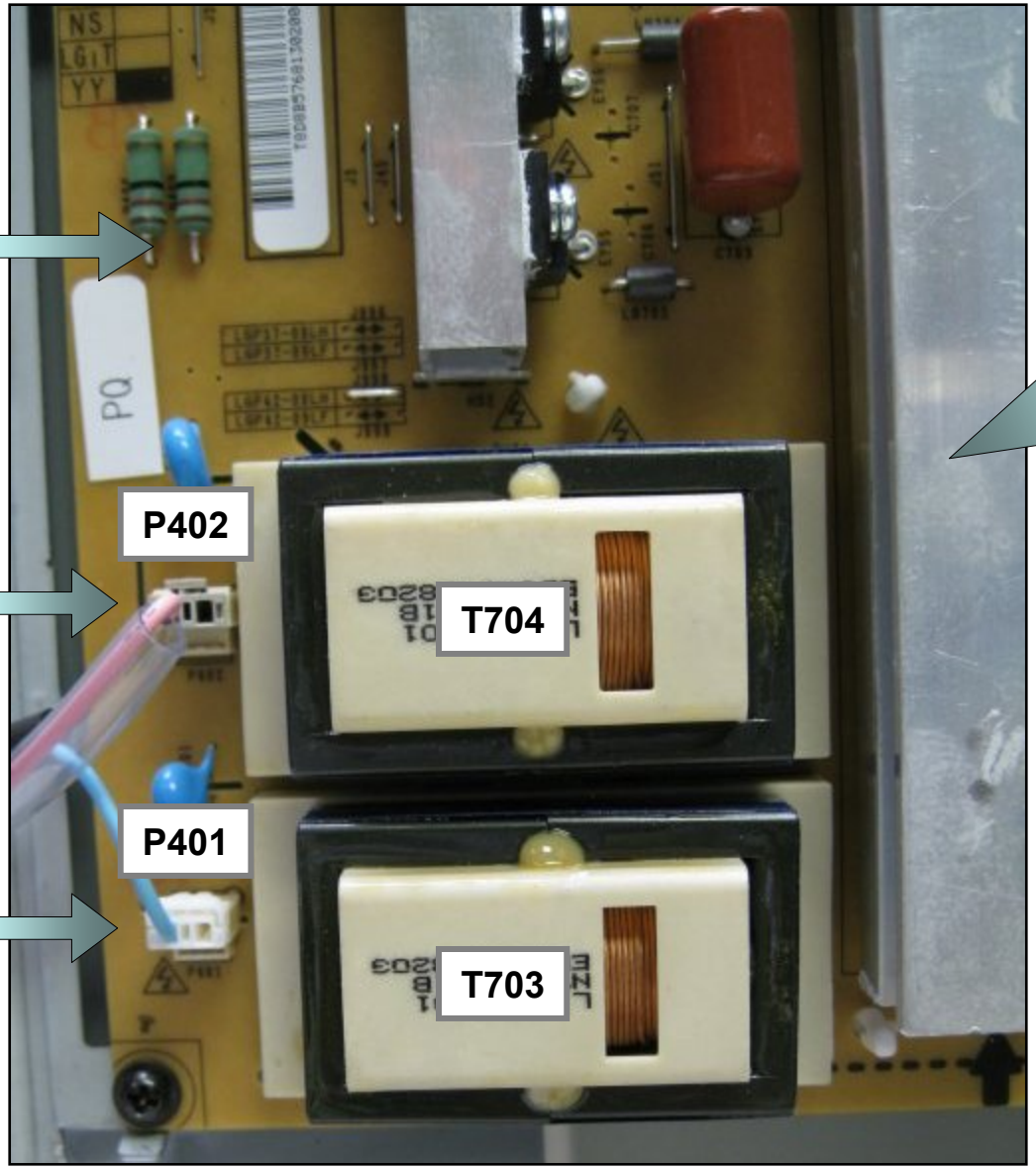
- **For CCFL, Hg gas is consumed mainly near the internal electrode**
- **For EEFL, longer life time is expected because there is no internal electrode consuming Hg gas**

Ballast PWB Layout

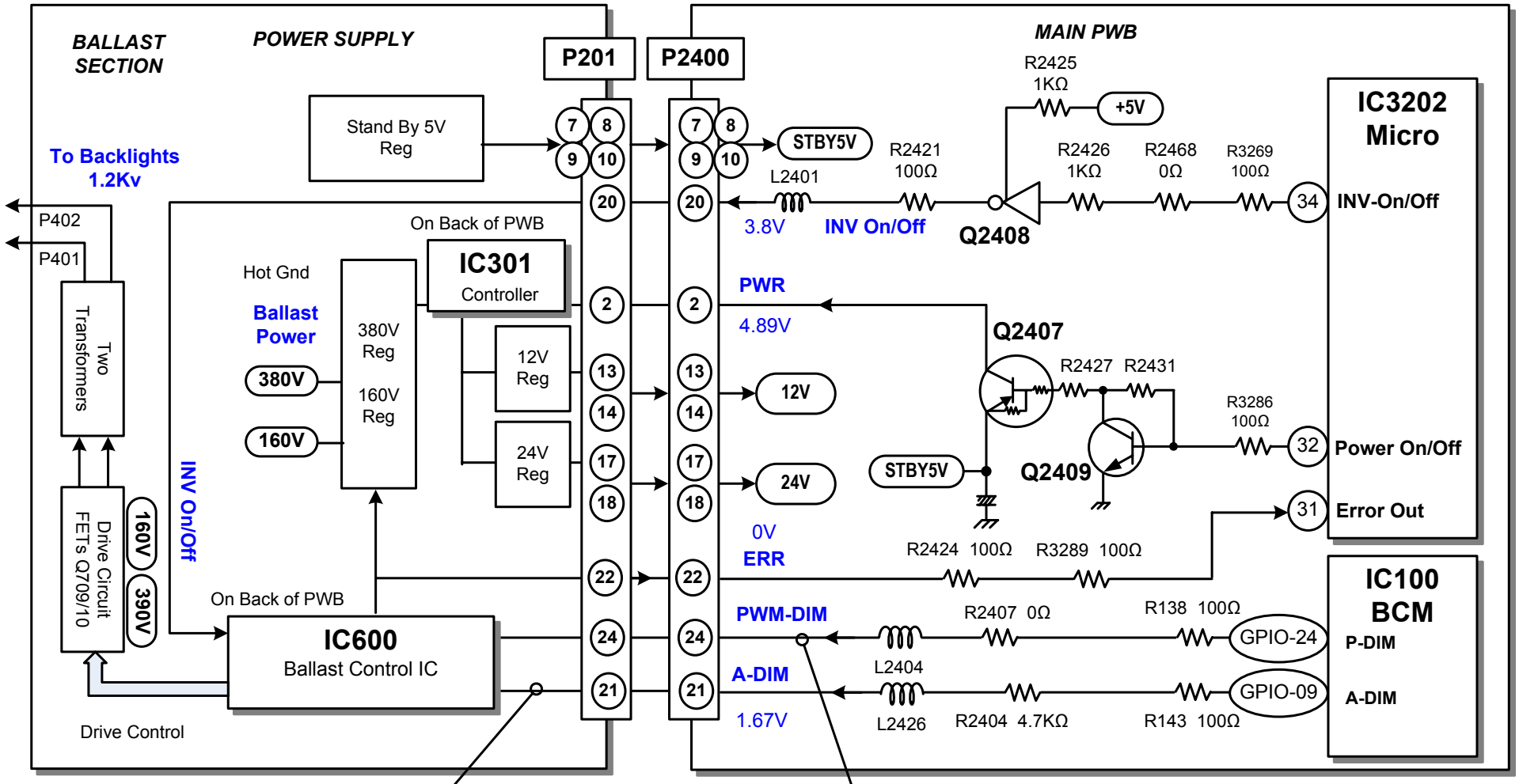
Viewed from rear

SMPS PWB





42LH50 P2400 on Main PWB To Power Supply P201 Ballast Turn On Circuit



VBR-A (Analog Dimming)
This line is a fixed voltage and not used.

VBR-B (PWM Dimming) Manipulates the Backlight Brightness via Customer's OSD. Manipulates the Backlight Brightness via the BCM Chip. Darker Picture, Darker Backlights to facilitate improved Contrast Ratio. 0.6V ~ 3.3V Range. Manipulated by the Video Processor IC100

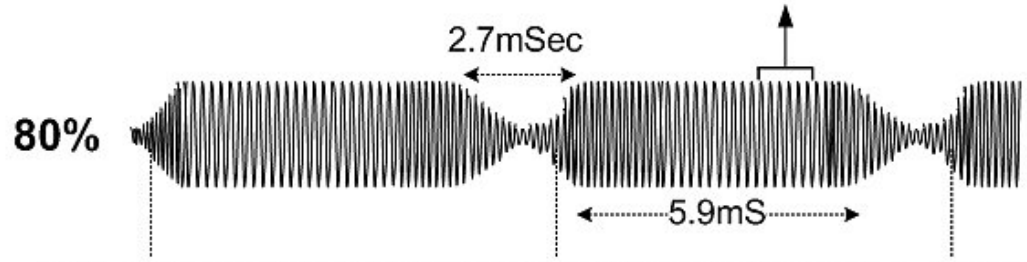
Power Supply Backlight Drive Signal Effects

Waveform taken from lose coupling.
Probe clamped on one of the Backlight Wires.
Use caution, 1.2Kv
Slow scope setting to 2.5mS to see PWM results.
The PWM amount can cause the frequency to be measured differently.

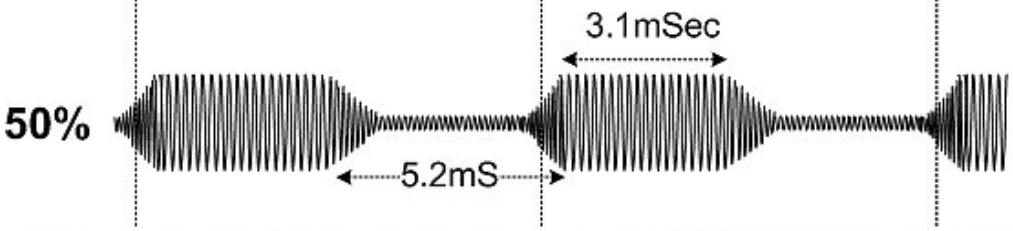
100% on Backlight Bar In Customer's OSD (3.32V PDIM) Pin 24 P201

PWMDIM manipulates the Burst Triangle Oscillator in the ballast drive IC.

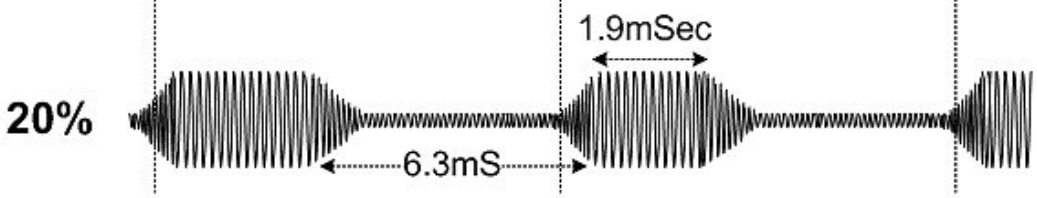
ADIM also manipulates the Burst Triangle Oscillator But it is not used.



80% on Backlight Bar In Customer's OSD (2.8V PDIM) Pin 24 P201



50% on Backlight Bar In Customer's OSD (2.0V PDIM) Pin 24 P201



20% on Backlight Bar In Customer's OSD (1.22V PDIM) Pin 24 P201

Note:
Backlights will attempt to fire 4 time. During these attempts, the Error line will change from 5V to 0V.

0V when lamp tries to fire or is lit.
5V when the lamps are not lit.

After 4 attempts, if the Error Out line returns to 5V, this tells the Micro to turn the set off.

Power Supply Connector P201 Voltage and Diode Check

P201 Odd "SMPS" to P2400 "Main PWB"

Pin	Label	STBY	Run	Diode Check
23	nc	nc	nc	nc
21	[1]A.DIM	0V	1.75V	Open
19	nc	nc	nc	nc
17	24V	0V	21.4V	0.81V
15	Gnd	Gnd	Gnd	Gnd
13	12V	0V	12.3V	1.2V
11	Gnd	Gnd	Gnd	Gnd
9	5V	5.06V	5.06V	2.85V
7	5V	5.06V	5.06V	2.85V
5	Gnd	Gnd	Gnd	Gnd
3	Gnd	Gnd	Gnd	Gnd
1	nc	nc	nc	nc

[1]ADIM Pin 21 Fixed and not used

P201 Even "SMPS" to P2400 "Main PWB"

Pin	Label	STBY	Run	Diode Check
24	[2]PDIM	0V	3.3V	Open
22	Err Out	0V	0V	Open
20	INV.ON	0V	4.5V	2.25V
18	24V	0V	21.4V	0.81V
16	Gnd	Gnd	Gnd	Gnd
14	12V	0V	12.3V	1.2V
12	Gnd	Gnd	Gnd	Gnd
10	5V	5.06V	5.06V	2.85V
8	5V	5.06V	5.06V	2.85V
6	Gnd	Gnd	Gnd	Gnd
4	Gnd	Gnd	Gnd	Gnd
2	PWR-ON	0V	4.5V	1.19V

[2]PDIM Pin 24 can vary according to type of signal being processed and the OSD Backlight setting. 0.6V 0% to 3.3V 100%. Output from the video processor IC100.

Diode Mode values taken with all Connectors Removed

Power Supply Connector SK100 and SK101 Voltage and Resistance

Diode Mode values taken with all Connectors Removed

SK100 "SMPS" to AC IN

Pin	Label	STBY	Run	Diode Check
1	L	120Vac		OL
2	N			OL

AC Voltage Readings Across Pins 1 and 2 for STBY and RUN.

SK101 "SMPS" to MASTER POWER SWITCH

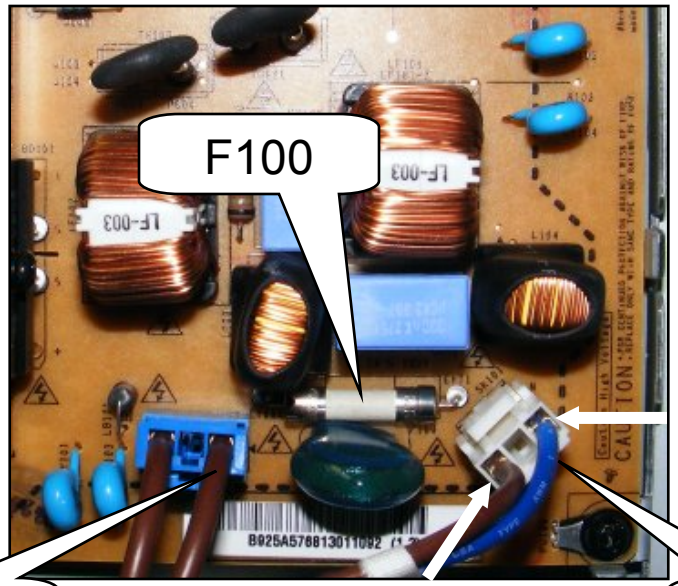
Pin	Label	STBY	Run	Diode Check
1	n/a	120Vac		OL
2	n/a			OL

AC Voltage Readings for either pin 1 or pin 2 in STBY and RUN with one lead on Neutral of SK100.

With the Master Power Switch Closed (On) AC flows.
When Open (Off) AC open and does not flow.

F100
6.3A/250V
AC IN

Bottom Right of SMPS



LCD Controller Board

The T-Con IC UC1 receives from the Main Board at CN1 12 Bit and CN2 12 Bit LVDS Signals (Video) which it processes into TFT Drive Signals. It delivers its output signals through connectors CN4 and CN5 to control the LCD Panel.

12V is supplied to the T-Con Board on connector CN1 from the Main Board (easily measured at fuse F1).

Diode LD1 is a boot up indicator and is helpful in troubleshooting as a quick indication of a loss of supply and or a Boot up problem. The main purpose of LD1 is to aid in the firing of the EEFL backlights when room light is minimum. It helps to excite the selenium in the EEFL lamp which is highly sensitive to Blue light. Once this lamp fires, it helps to excite the others.

There is one regulator that creates 1.19V developed at pin 2 (Center Leg) of U11.

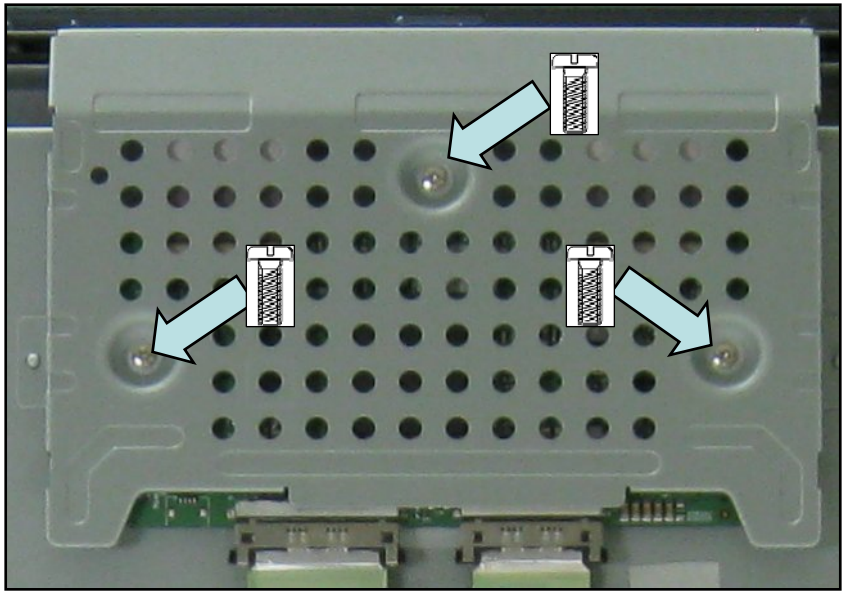
U5 is a DC to DC converter IC which develops the Panels driver voltages. 16V, 3.3V, -5V and 26V.

These voltages can be read at the ribbon connector or at test points on the board.

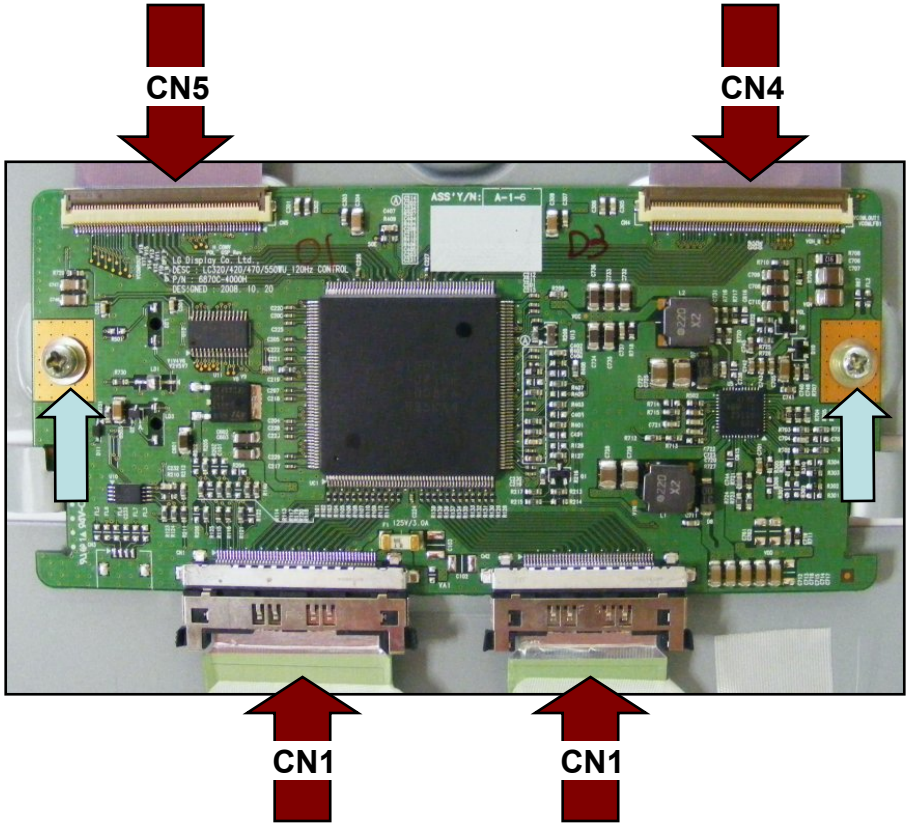
T-CON (TFT Drive) PWB Removal

STEP (1)

Remove the 3 Screws in the T-CON shield and remove the shield



The two screws shown in the picture below are for the Service Position. They would have been removed when removing the shield. Be sure to reinstall them if servicing the T-CON PWB.

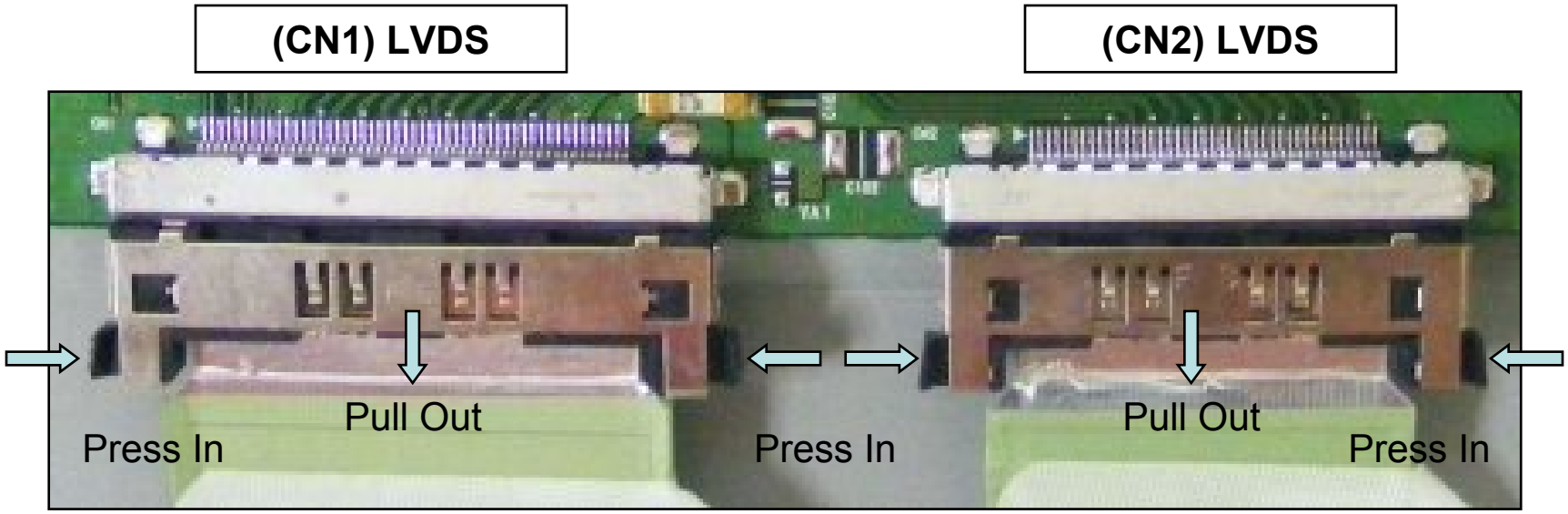


STEP (2)

Disconnect CN1, CN2, CN4 and CN5.
See next slide for details about removing cables.

T-CON (TFT DRIVE) PWB REMOVAL CONTINUED:

UNLOCKING CN1 and CN2 LVDS Cables



To remove the LVDS cables CN1 and CN2;
Press in on the two tabs and slowly rock the cable out of the connector.
(Shown by the arrows in Figure above)

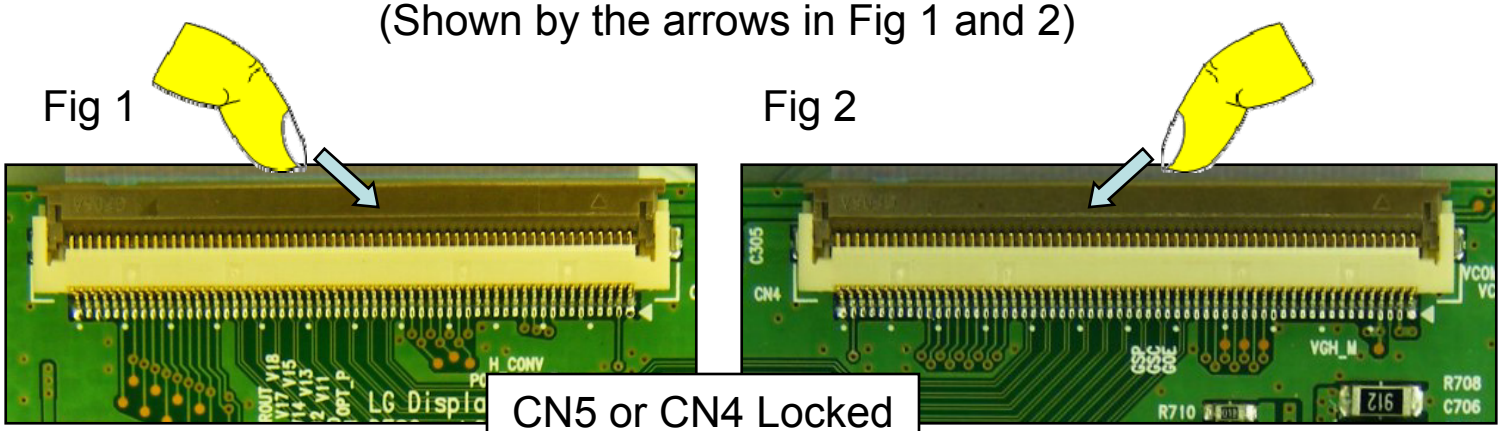
T-CON (TFT DRIVE) PWB REMOVAL CONTINUED: UNLOCKING CN4 and CN5

To remove the flex cables to the TFT Panel, CN4 or CN5, place a soft thin object like a fingernail underneath the black locking tab and gently pull forward.

(Shown by the arrows in Fig 1 and 2)

Fig 1

Fig 2

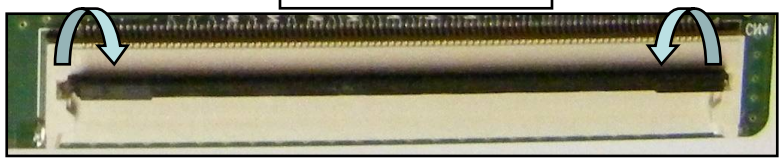


CN5 or CN4 Locked

Flip the lock up and back from the flex cable.
Then the flex cable can be easily removed.

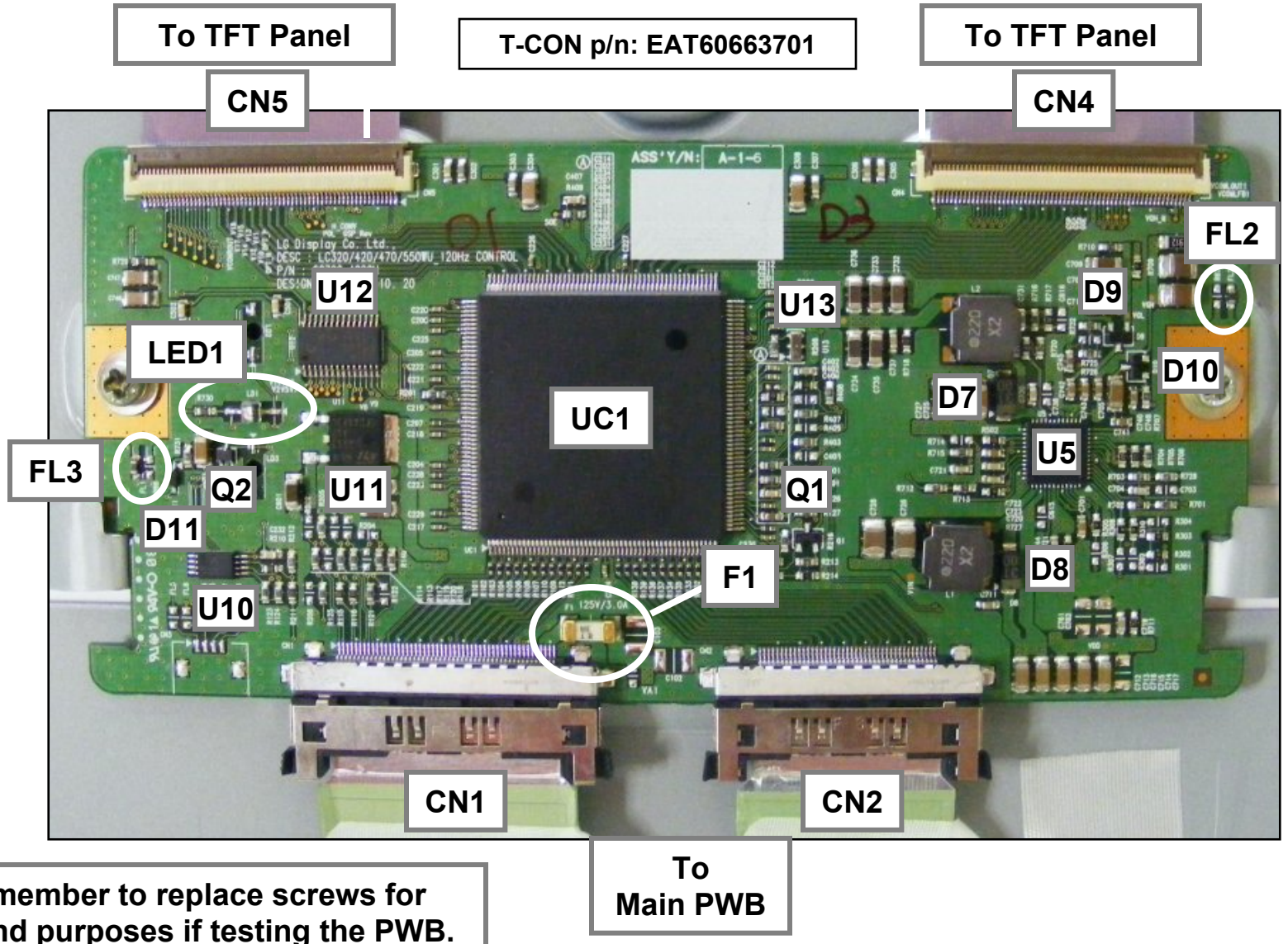
Unlocked

Fig 3



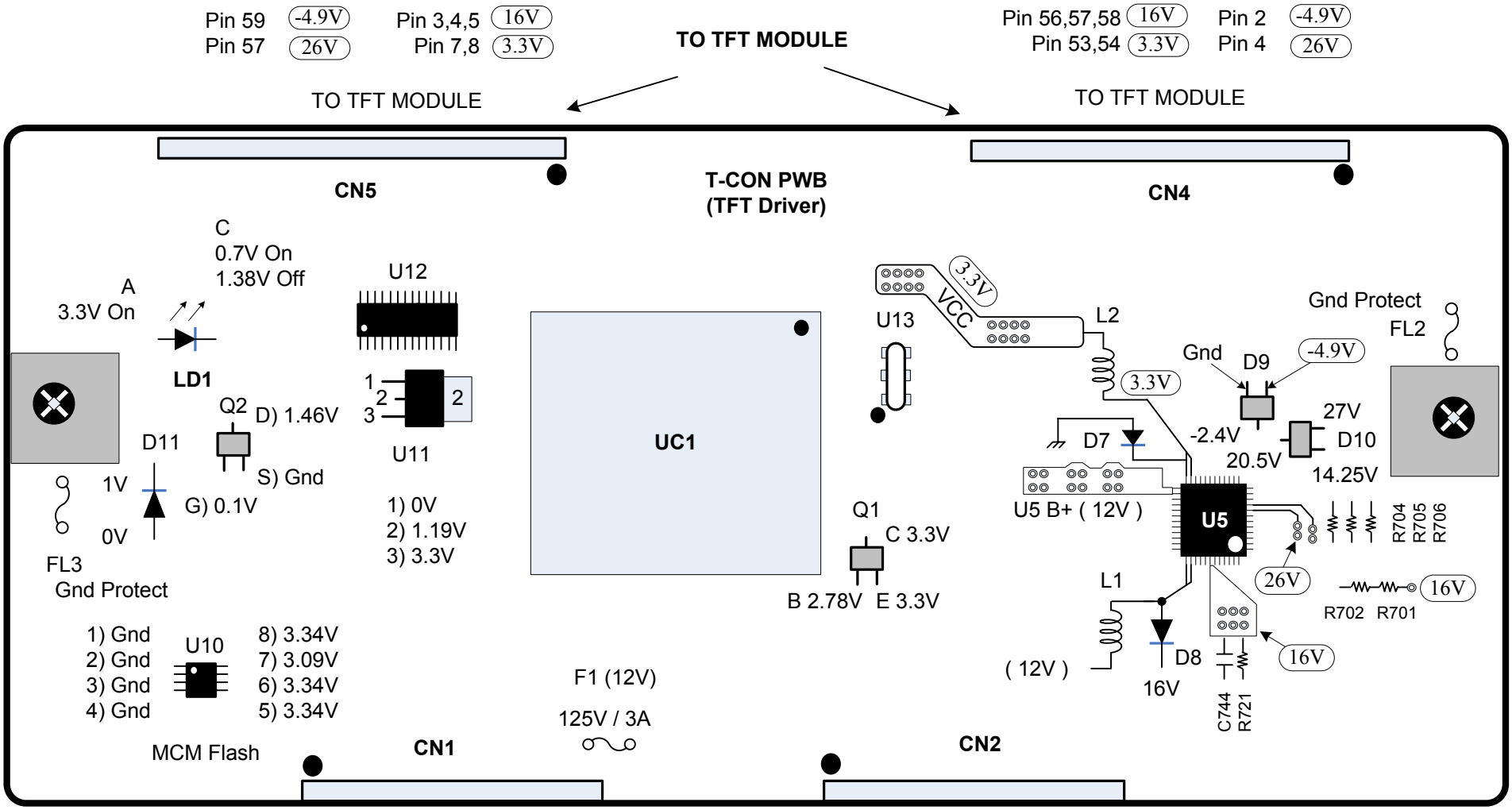
The locking tab is flipped down

T-CON (TFT Drive) PWB (Shield Removed)



Remember to replace screws for ground purposes if testing the PWB.

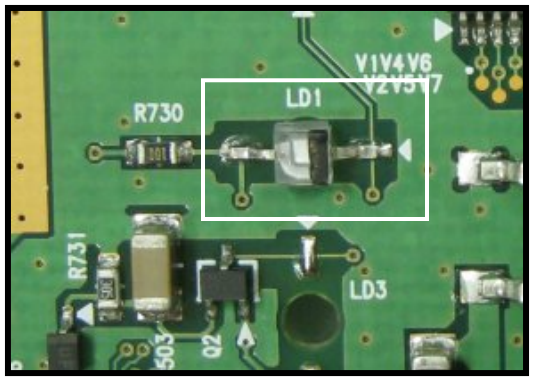
42LH50 T-CON (TFT Drive) PWB Drawing (Components and Voltages Identified)



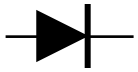
T-CON (TFT Drive) PWB Checks

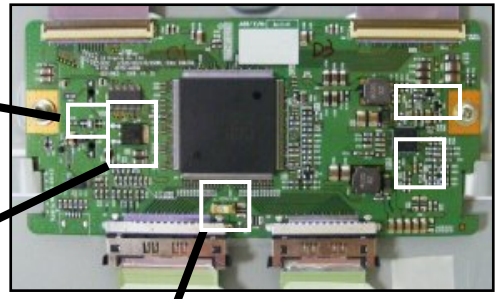
Use LD1 to determine if the boot up sequence of the T-CON is OK. This LED will turn bright Blue shortly after power is applied then will go out in about 30 seconds. This assist the backlights in firing.

LD1



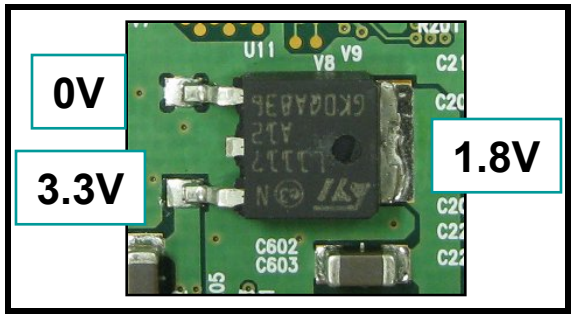
Power Off	Power 1st On	Power On
Anode 0V Cathode 0V	Anode 3.3V Cathode 0.7V	Anode 3.3V Cathode 1.4V
LED OFF	LED ON	LED OFF

Anode  Cathode

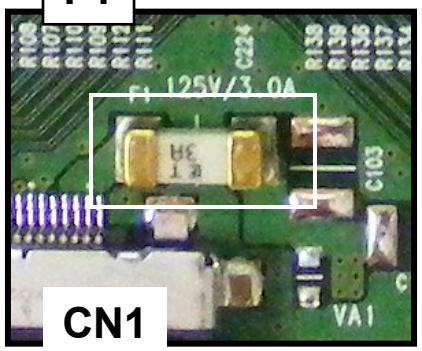


T-CON PWB

Check the Regulator U11 for Correct Voltage



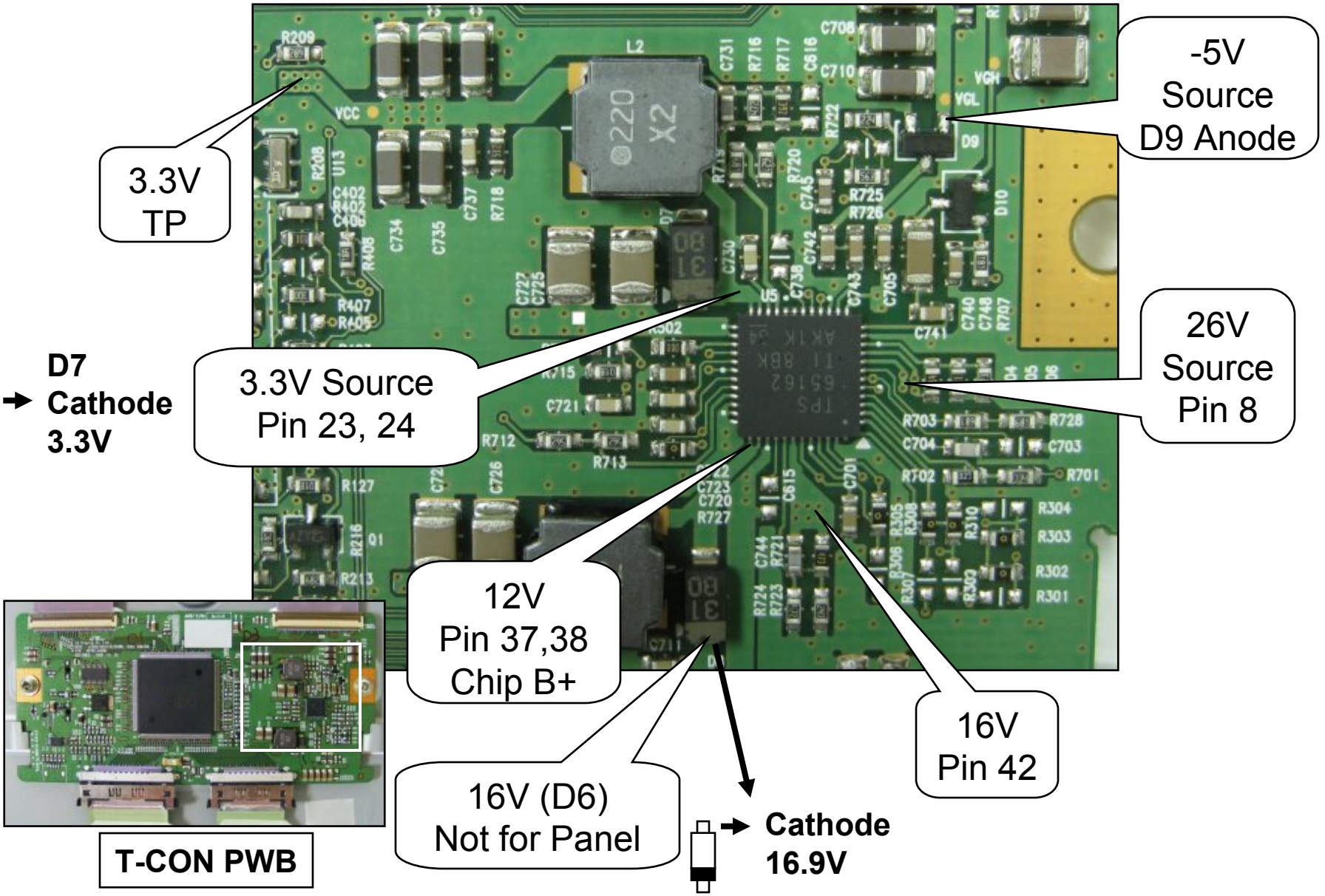
F1



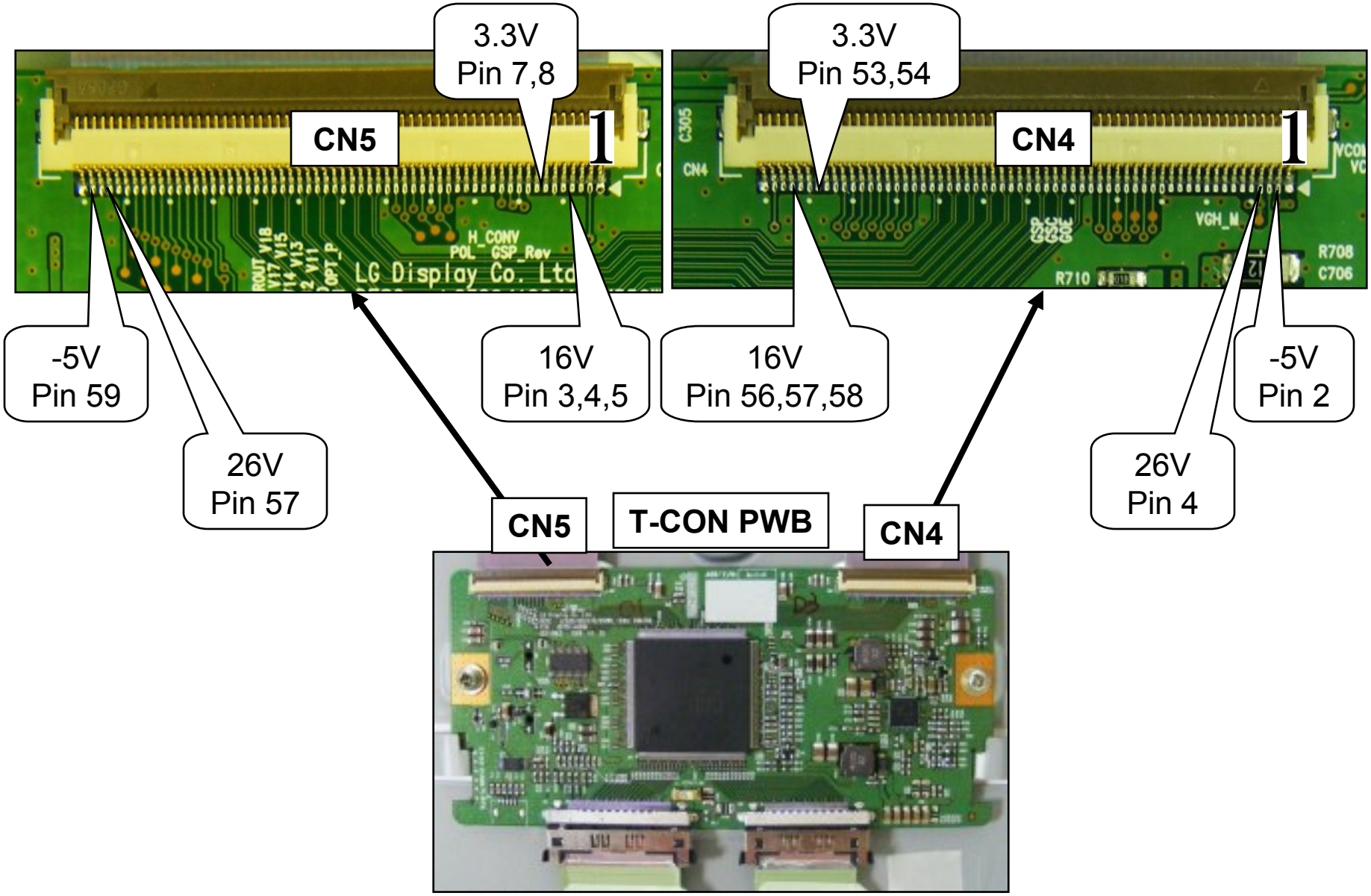
Check Fuse F1 for 12V

From Pins 48~51

T-CON (TFT Driver) Board CN4 and CN5 (Voltage Sources)



T-CON (TFT Driver) Board CN4 and CN5 (Voltage Check)



T-CON PWB Connector CN1 to the Main PWB (Voltage and Diode Check)

CN1 “T-CON“ to P1100 CONNECTOR "Main"

Diode Mode values taken with all Connectors Removed

Pin	Label	Run	Diode Test
1	Gnd	Gnd	Gnd
2	n/c	n/c	n/c
3	n/c	n/c	n/c
4	n/c	n/c	n/c
5	n/c	n/c	n/c
6	n/c	n/c	n/c
7	LVDS-Sel	0V	Gnd
*8	*PWM-DIM	3.3V	Open
9	OPC-Out	3.3V	Open
10	OPC-EN	0.7V	Open
11	OPC-Out2	n/c	Open
12	URSA-A0P	1.3V	Open
13	URSA-A0M	1.2V	Open
14	URSA-A1P	1.3V	Open
15	URSA-A1M	1.2V	Open
16	URSA-A2P	1.4V	Open
17	URSA-A2M	1.4V	Open
18	Gnd	Gnd	Gnd
19	URSA-ACKP	1.25V	Open
20	URSA-ACKM	1.26V	Open

Pin	Label	Run	Diode Test
21	Gnd	Gnd	Gnd
22	URSA-A3P	1.4V	Open
23	URSA-A3M	1.1V	Open
24	URSA-A4P	1.4V	Open
25	URSA-A4M	1.1V	Open
26	Gnd	Gnd	Gnd
27	n/c	n/c	n/c
28	URSA-B0P	1. 4V	Open
29	URSA-B0M	1.1V	Open
30	URSA-B1P	1.4V	Open
31	URSA-B1M	1.1V	Open
32	URSA-B2P	1.21V	Open
33	URSA-B2M	1.22V	Open
34	Gnd	Gnd	Gnd
35	URSA-BCKP	1.21V	Open
36	URSA-BCKM	1.22V	Open
37	Gnd	Gnd	Gnd
38	URSA-B3P	1.2V	Open
39	URSA-B3M	1.21V	Open
40	URSA-B4P	1.44V	Open

Pin	Label	Run	Diode Test
41	URSA-B4M	1.09V	Open
42	Gnd	Gnd	Gnd
43	Gnd	Gnd	Gnd
44	Gnd	Gnd	Gnd
45	Gnd	Gnd	Gnd
46	Gnd	Gnd	Gnd
47	n/c	n/c	n/c
48	**LVDS 12V**	**12V**	**Open**
49	**LVDS 12V**	**12V**	**Open**
50	**LVDS 12V**	**12V**	**Open**
51	**LVDS 12V**	**12V**	**Open**

*Pin 8 (PWM-DIM) is not used by the T-CON board.

T-CON PWB Connector CN2 to the Main PWB (Voltage and Diode Check)

CN2 "T-CON" to P1101 CONNECTOR "Main"

Diode Mode values taken with all Connectors Removed

Pin	Label	Run	Diode Test
1	n/c	n/c	n/c
2	n/c	n/c	n/c
3	n/c	n/c	n/c
4	n/c	n/c	n/c
5	n/c	n/c	n/c
6	n/c	n/c	n/c
7	n/c	n/c	n/c
8	n/c	n/c	n/c
9	Gnd	Gnd	Gnd
10	URSA-C0P	1.28V	Open
11	URSA-C0M	1.2V	Open
12	URSA-C1P	1.3V	Open
13	URSA-C1M	1.2V	Open
14	URSA-C2P	1.3V	Open
15	URSA-C2M	1.2V	Open
16	Gnd	Gnd	Gnd
17	URSA-C2P	1.23V	Open
18	URSA-C2M	1.23V	Open
19	Gnd	Gnd	Gnd
20	URSA-C3P	1.3V	Open

Pin	Label	Run	Diode Test
21	URSA-C3M	1.2V	Open
22	URSA-C4P	1.13V	Open
23	URSA-C4M	1.18V	Open
24	Gnd	Gnd	Gnd
25	Gnd	Gnd	Gnd
26	URSA-D0P	1.29V	Open
27	URSA-D0M	1.25V	Open
28	URSA-D1P	1.29V	Open
29	URSA-D1M	1.3V	Open
30	URSA-D2P	1.3V	Open
31	URSA-D2M	1.2V	Open
32	Gnd	Gnd	Gnd
33	URSA-DCKP	1.23V	Open
34	URSA-DCKM	1.29V	Open
35	Gnd	Gnd	Gnd
36	URSA-D3P	1.3V	Open
37	URSA-D3M	1.25V	Open
38	URSA-D4P	1.4V	Open
39	URSA-D4M	1.15V	Open
40	Gnd	Gnd	Gnd
41	Gnd	Gnd	Gnd

MAIN PWB SECTION

The Main PWB processes all video signal input types, Tuner (VSB, 8VSB and QAM), Component, Composite, S-In, HDMI and RGB (PC).
There are two LVDS cable feeds that go to the T-CON. Each one carries duel 12 bit LVDS Video signals that have been prepared for the T-CON board (TFT Driver Control board).

The Main board receives its operational B+ from the Power Supply via P2400.

STAND-BY
- **STBY 5V pins 7~10**

RUN
- **12V pins 13 and 14**
- **24V pins 17 and 18.**

The Main board also develops several B+ sources on the board.

LVDS
- **LVDS 12V (Actually just switched 12V input from the power supply).**

GENERAL
- **5V (Actually just switched STBY 5V input from the power supply).**

TUNER and VSB CIRCUIT
- **9V**
- **5V**
- **3.3V**
- **1.2V**

AUDIO
- **3.3V**
- **1.8V**

BCM VIDEO PROCESSOR
- **1.2V, 1.26V, 1.8V, and 3.3V**

Removing the Main PWB

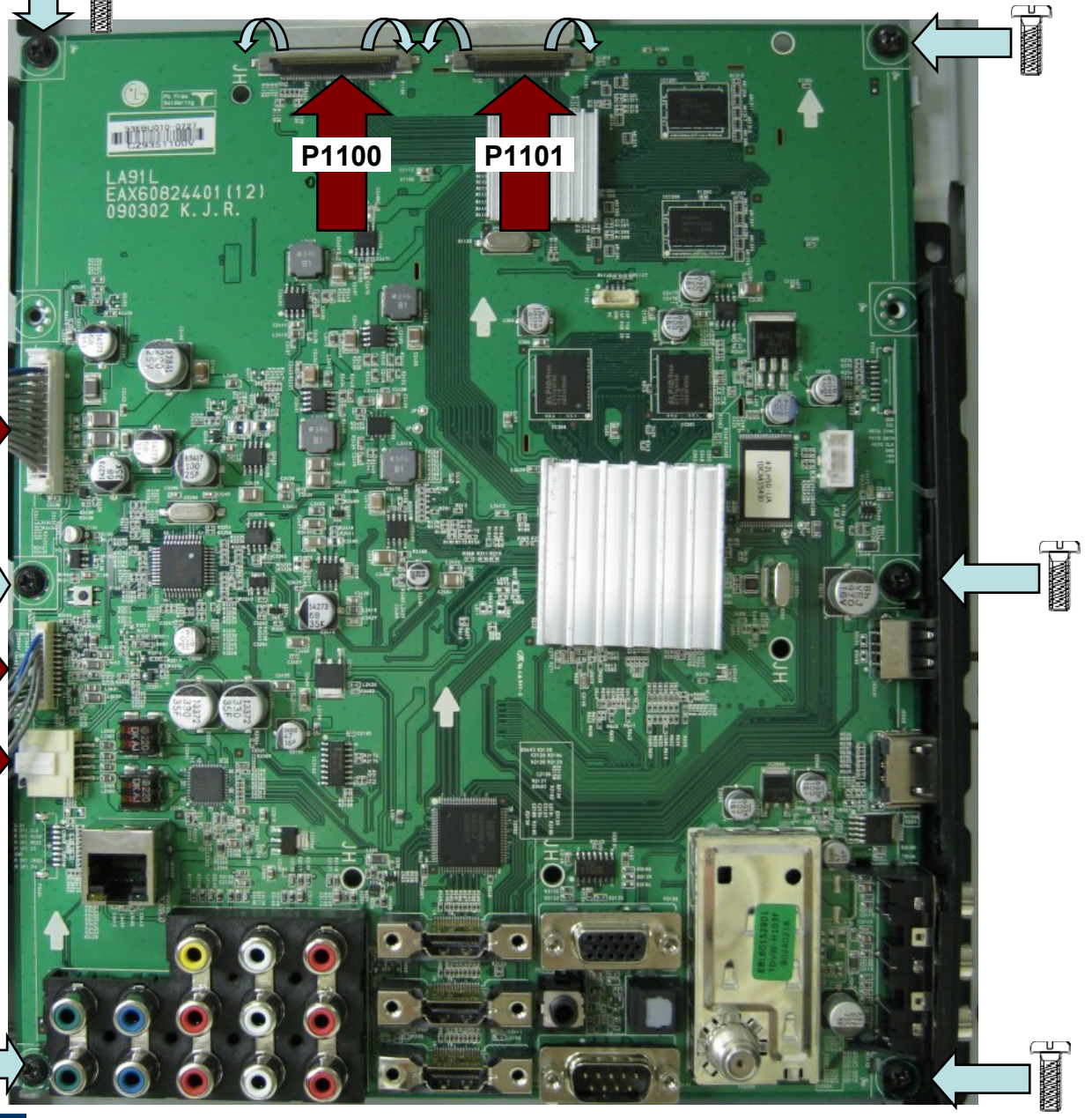
Disconnect P2400, P3400, P2300, P1100 and P1101.

Remove any tape holding down any cables. Remove the 6 screws indicated by the arrows.

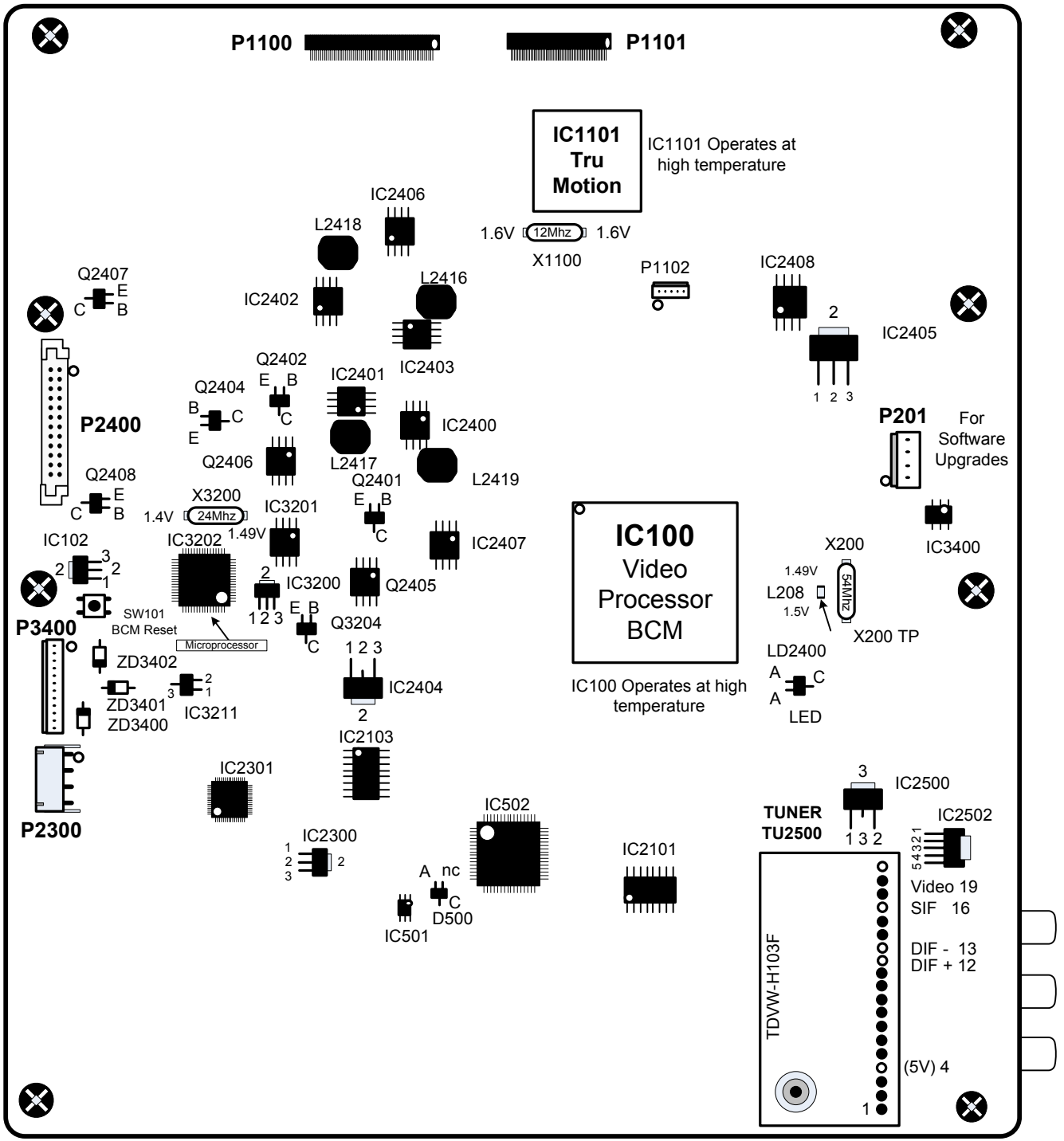
Press in on the top and bottom release tabs to remove P2400.

NOTE: Be sure to check on top and behind the Video and Tru-Motion Processor ICs. Look for a piece of Chocolate (Heat Transfer Material). Be sure to transfer to new PWB if present on the old one.

Flip the locking tab upward, pull the LVDS ribbon out.

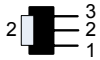


42LH50 MAIN PWB COMPONENT LAYOUT



42LH50 MAIN (FRONT SIDE) SIMICONDUCTORS

IC102 BCM Reset

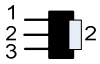


Pin	
1	3.3V
2	Gnd
3	3.29V

IC2101 RGB

Pin	Sync
[1]	1.9V
[2]	1.9V
[3]	4.38V
[4]	1.9V
[5]	1.9V
[6]	4.5V
[7]	Gnd
[8]	n/c
[9]	1.9V
[10]	1.9V
[11]	4.38V
[12]	1.9V
[13]	1.9V
[14]	5V

IC2300 1.8V Amp



Pin	Audio
1	Gnd
2	1.8V
3	3.3V

IC2103 RS232

Pin	Rx/Tx
[1]	3.25V
[2]	3.27V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	n/c
[8]	Gnd
[9]	Gnd
[10]	4.76V
[11]	4.76V
[12]	3.17V
[13]	3.3V
[14]	3.3V
[15]	3.3V
[16]	5V

IC2400 1.2V Core

Pin	
[1]	Gnd
[2]	5V
[3]	Gnd
[4]	0.8V
[5]	0.9V
[6]	3.23V
[7] [8]	1.2V

IC2401 5V USB

Pin	Fan
[1]	0V
[2]	12V
[3]	Gnd
[4]	0.8V
[5]	0.8V
[6]	5V
[7]	5V
[8]	5V

IC2402 1.8V-MEMC

Pin	
[1]	Gnd
[2]	5V
[3]	Gnd
[4]	0.8V
[5]	1V
[6]	4.98V
[7]	1.89V
[8]	1.89V

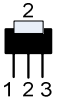
IC2403 3.3V/A3.3V

Pin	Reg
[1]	Gnd
[2]	12V
[3]	Gnd
[4]	0.8V
[5]	0.9V
[6]	3.23V
[7]	3.37V
[8]	3.37V

IC2404 3.3V-ST

Pin	3.3V-VDDP-ST
1	Gnd
2	3.3V
3	5V

IC2405 1.8V-DDR



Pin	Reg
[1]	0.58V
[2]	1.8V
[3]	3.3V

IC2406 1.26V-MEMC

Pin	Reg
[1]	n/c
[2]	1.87V
[3]	1.87V
[4]	n/c
[5]	n/c
[6]	1.27V
[7]	0.8V
[8]	Gnd

IC2407 A2.5V Reg

Pin	
[1]	n/c
[2]	3.23V
[3]	3.3V
[4]	n/c
[5]	n/c
[6]	2.53V
[7]	0.53V
[8]	Gnd

IC2408 1.8V-DDR

Pin	Reg
[1]	Gnd
[2]	3.3V
[3]	0.89V
[4]	0.9V
[5]	1.8V
[6]	3.3V
[7]	1.8V
[8]	0.89V

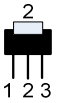
IC2500 9V Reg

Pin	for Tuner
[1]	12.3V
[2]	8.9V
[3]	Gnd

IC2502 5V Reg

Pin	for Tuner
[1]	8.98V
[2]	1.9V
[3]	5V
[4]	0V
[5]	0V

IC3200 Micro Reset



Pin	
[1]	3.3V
[2]	Gnd
[3]	0.6V

IC3201 uP EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	3.29V
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	0V
[8]	3.3V

IC3211 Power Det

Pin	
[1]	Gnd
[2]	3.3V
[3]	3.36V

IC3400 USB 5V

Pin	
[1]	5V
[2]	0V
[3]	3.3V
[4]	3.3V
[5]	0V
[6]	5V

IC501 HDMI Remote

Pin	
[1]	3.3V
[2]	3.3V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	3.19V

Q2401 24V PWR Sw

Pin	Q2405
B	0.59V
C	0V
E	0V

Q2402 5V Sw Ctl

Pin	Q2406
B	0.59V
C	0V
E	0V

Q2404 LVDS Sw Ctl

Pin	Q2406
B	0.59V
C	0V
E	0V

Q2405 24V PWR

Pin	12V PWR
[1]	21.28V
[2]	12.31V
[3]	12.31V
[4]	6V
[5]	12.31V
[6]	12.31V
[7]	21.28V
[8]	21.28V

Q2406 5V and

Pin	LVDS 12V Switch
[1]	5V
[2]	0.2V
[3]	12.3V
[4]	6V
[5]	12.3V
[6]	12.3V
[7]	5V
[8]	5V

Q2407 POW On/Off2

Pin	
B	3.37V
C	4.7V
E	5V

Q2408 INV Ctl

Pin	
B	0V
C	4.55V
E	0V

Q3204 Micro

Pin	Reset Sw.
B	0.59V
C	0V
E	0V

D500 IC501 shunt

Pin	
A1	0V
C	3.1V
A2	3.29V

LD2400 A3.3V OK

Pin	
A1	n/c
C	Gnd
A2	1.62V

ZD3400 IR Clamp

Pin	
C	2.68V
A	Gnd

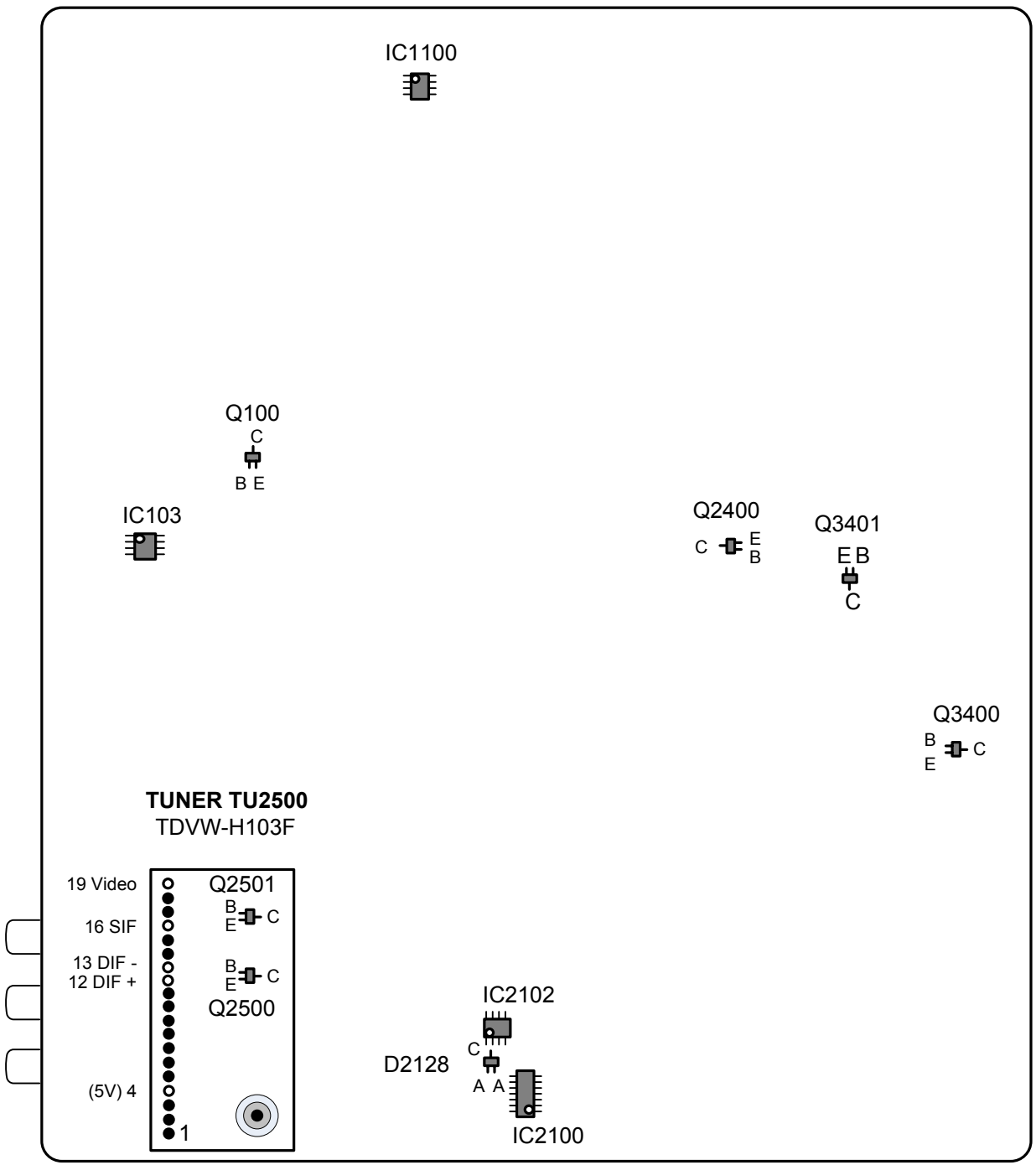
ZD3401 Key2 Clamp

Pin	
C	3.3V
A	Gnd

ZD3402 Key1 Clamp

Pin	
A	Gnd
C	3.3V

42LH50
Main Board
(Back Side)
Component Layout



42LH50 MAIN (BACK SIDE) SIMICONDUCTORS

IC103 BCM EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	Gnd
[8]	3.3V

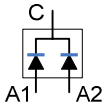
IC1100 SPI Flash

Pin	
[1]	0V
[2]	1.4V
[3]	3.3V
[4]	Gnd
[5]	0V
[6]	0.34V
[7]	3.3V
[8]	3.3V

IC2102 RGB EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3V
[6]	3.7V
[7]	4.8V
[8]	4.49V

D2128 5V to IC2102

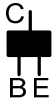


Pin	
A1	5V
C	4.5V
A2	0V

IC2100 RS232

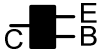
Pin	Rx/Tx
[1]	3.3V
[2]	5.4V
[3]	0V
[4]	0V
[5]	(-5V)
[6]	(-5V)
[7]	(-5V)
[8]	0V
[9]	3.29V
[10]	3V
[11]	n/c
[12]	n/c
[13]	0V
[14]	5.4V
[15]	Gnd
[16]	3.3V

Q100 IC101 Flash Write Protect



Pin	
B	0V
C	3.3V
E	0V

Q2400 12V PWR Ctl

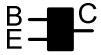


Pin	Q2405
B	0V
C	0V
B	0.778V

Q2500 Tuner SIF

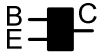
Pin	Buffer
B	0.898V
C	0V
E	0.246

Q2501 Tuner Video



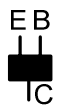
Pin	Buffer
B	3.4V
C	0V
E	2.79V

Q3400 LED PWR On



Pin	
B	0V
C	3.3V
E	0V

Q3401 EDID WP

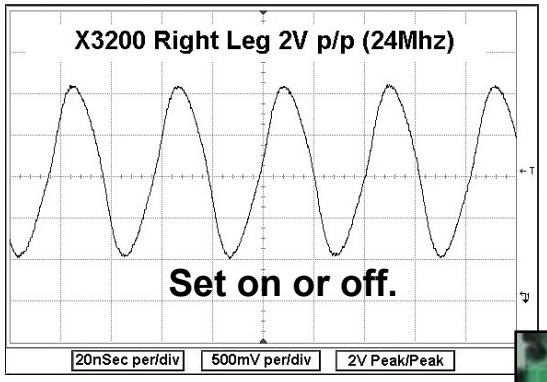


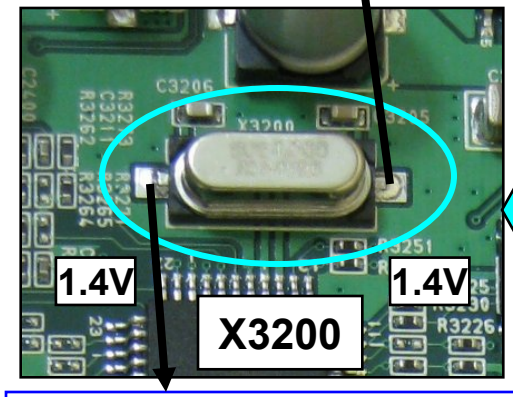
Pin	
B	0V
C	4.8V
E	0V

Main PWB X100, X1100 and X1005 Crystal Check

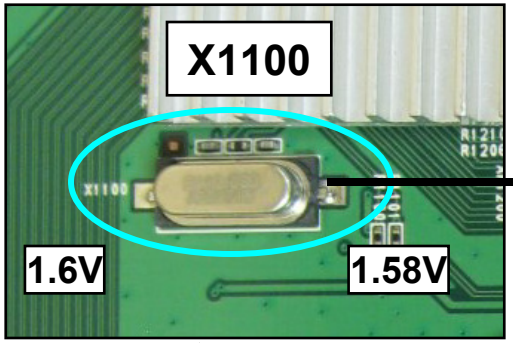
IC3202 Microprocessor Crystal

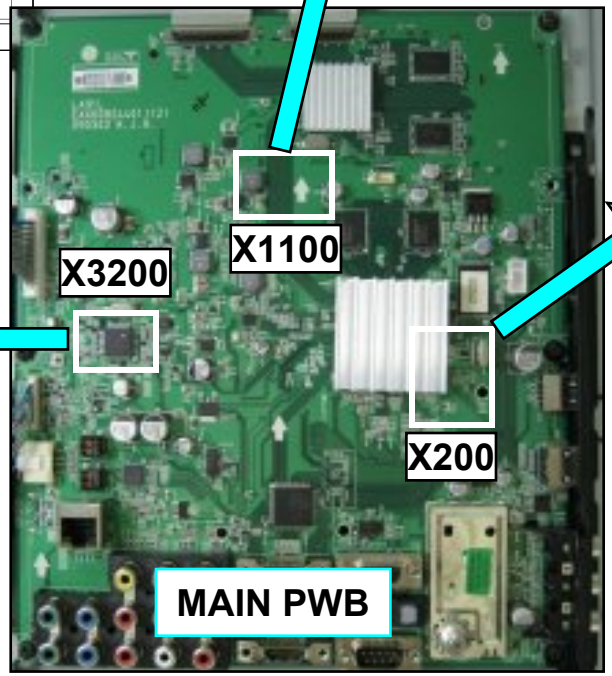
2Vp/p 24Mhz Right Leg





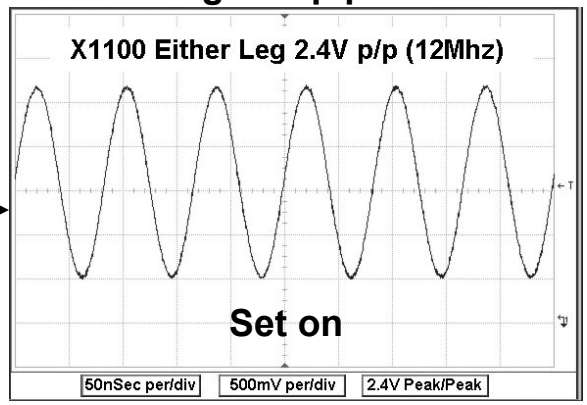
1.8Vp/p 24Mhz Left Leg

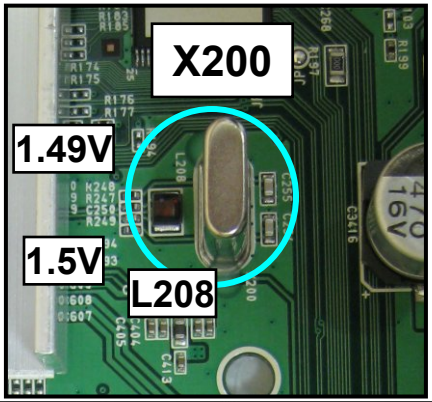




TruMotion IC1100 Crystal

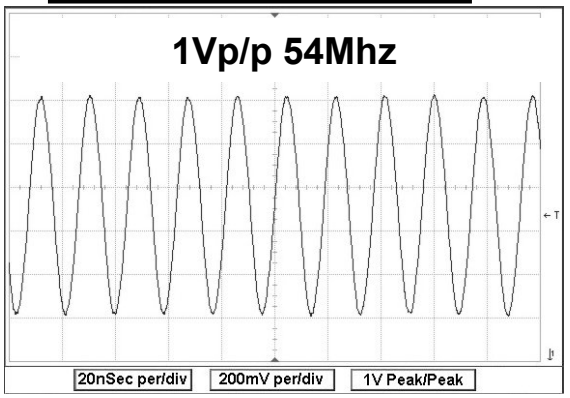
Either leg 2.4Vp/p 12Mhz



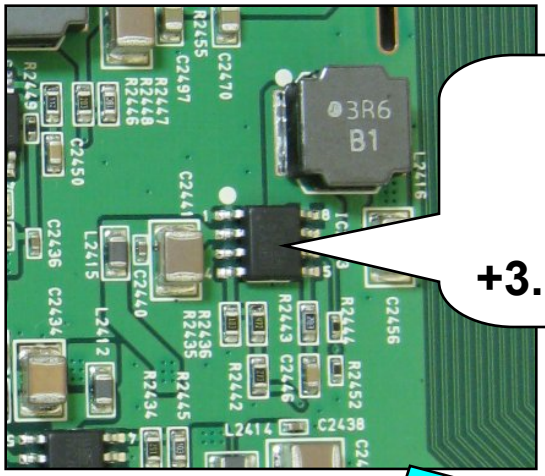


BCM Crystal X200

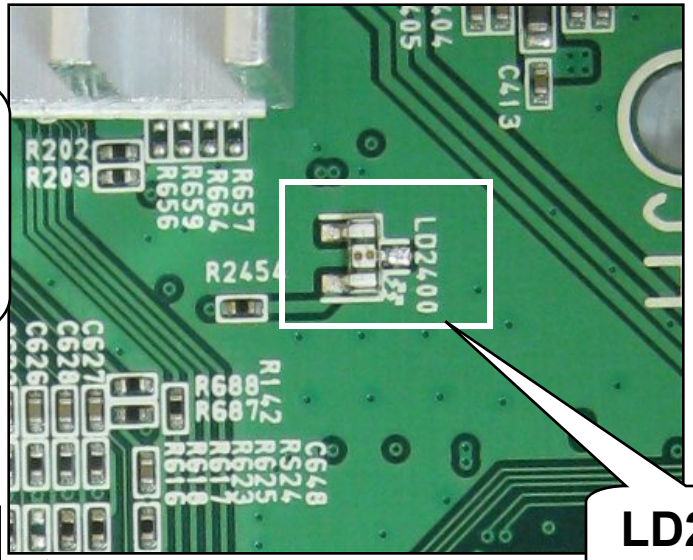
Set on. Use bottom leg of L208



Main PWB LD2400 Function and Voltages

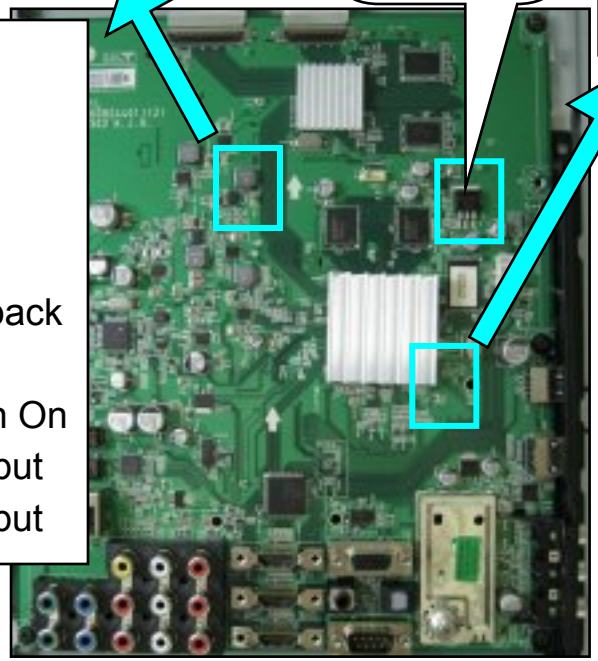


IC2403
A3.3V
+3.3V
+3.3-MEMC Reg.



LD2400

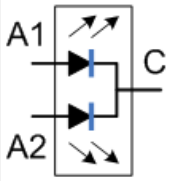
Q2405
12V PWR



IC2403

Pin		
[1]	Gnd	
[2]	12V	Input
[3]	Gnd	
[4]	0.8V	Feedback
[5]	0.9V	
[6]	3.23V	Turn On
[7]	3.37V	Output
[8]	3.37V	Output

LD2400 A3.3V OK



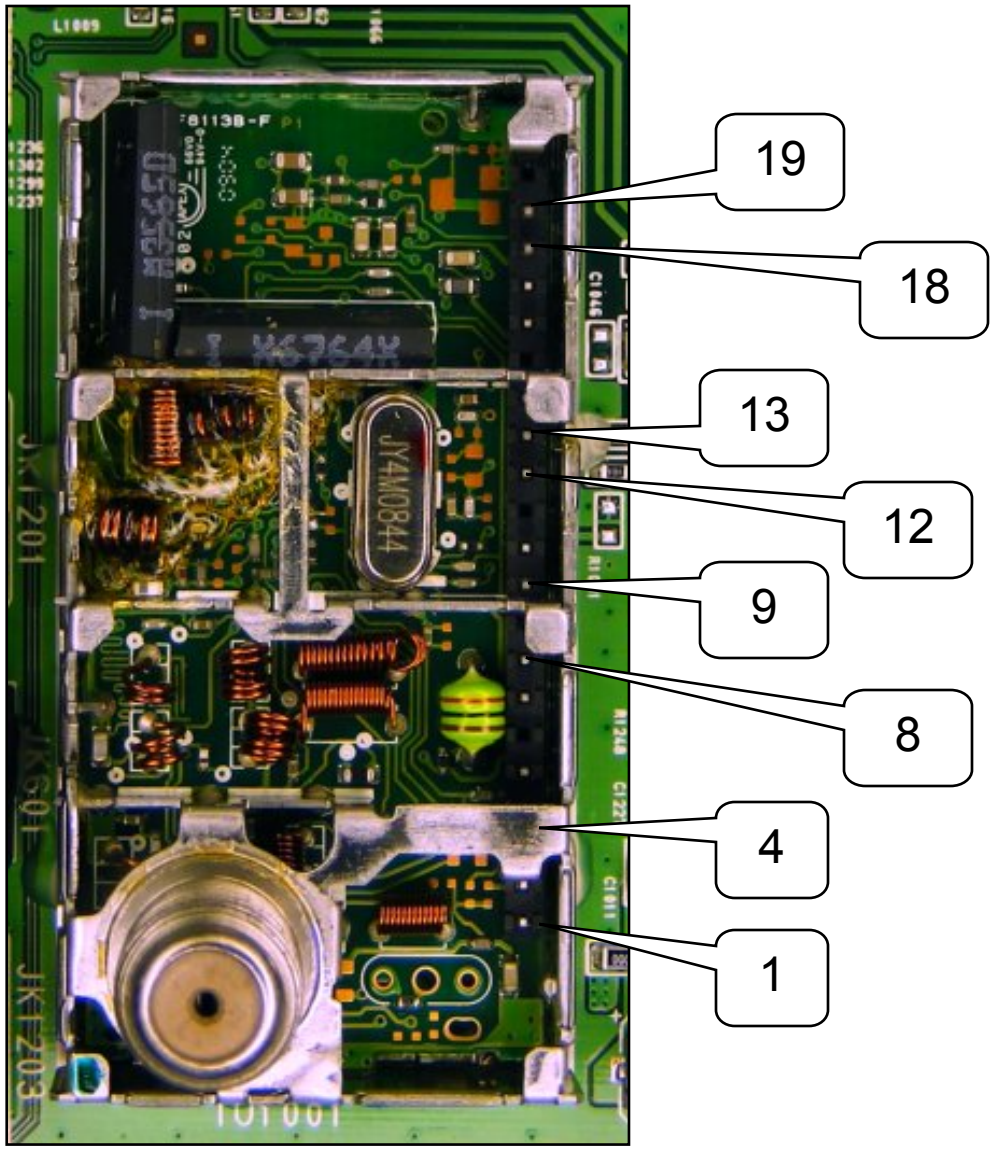
Pin	
A1	n/c
C	Gnd
A2	1.62V

Main PWB LD2400 and IC2403 Locations

Use LD2400 as a visual aid.
This lets you know;

- **12V from Power Supply is arriving.**
- **Q2405 (12V PWR) switch is working.**
- **IC2403 is outputting voltage.**
  - **(A3.3V regulator)**
  - **(+3.3V regulator)**
  - **(+3.3V-MEMC regulator)**

Main PWB Tuner with Shield Off (Pin ID)



TDVW-H103F
TU1001

	20	Shield	
Outputs On Analog Channels	19	VIDEO_OUT	(3.15V)
	18	AUDIO_OUT	(2.45V)
Not Used	17	NC-4	
	16	SIF	(2.5V)
	15	NC	
	14	IF_AGC	(3.2V)
Outputs On Digital Channels	13	DIF (-)	(0V)
	12	DIF (+)	(0V)
Not Used	11	NC-3	
Not Used	10	AS	(1.38V)
	9	SCL	(5V)
	8	SDA	(5V)
	7	GND (2)	
Not Used	6	NC-(VT)	
Not Used	5	RF-AGC	(4.46V)
	4	+B (5V)	(5V)
	3	GND (1)	
Not Used	2	NC-2	(0V)
Not Used	1	NC_1	(0V)

Main PWB Tuner Video and SIF Output Check

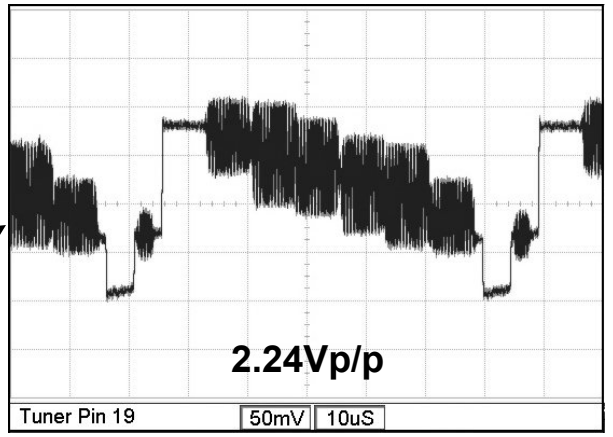
USING COLOR BAR SIGNAL INPUT

TDVW-H103F
or UCA36AL
TU2500

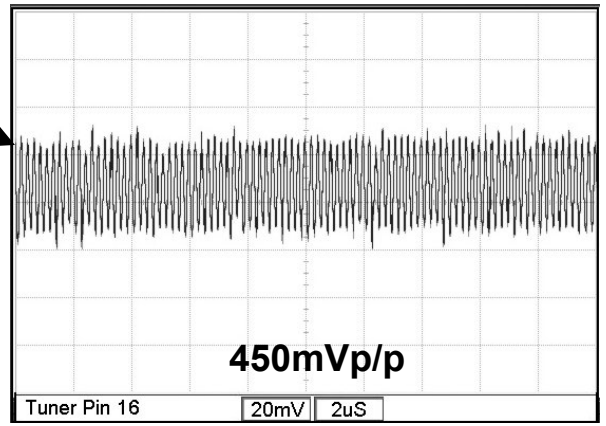
Not Used	1	NC_1	(0V)
Not Used	2	NC-2	(0V)
	3	GND (1)	
	4	+B (5V)	(5V)
Not Used	5	RF-AGC	(4.46V)
Not Used	6	NC-(VT)	
	7	GND (2)	
	8	SDA	(5V)
	9	SCL	(5V)
Not Used	10	AS	(1.38V)
Not Used	11	NC-3	
Outputs On Digital Channels	12	DIF (+)	(0V)
	13	DIF (-)	(0V)
	14	IF_AGC	(3.2V)
	15	+B (2)	
	16	SIF	(2.5V)
Not Used	17	NC-4	
	18	AUDIO_OUT	(2.45V)
Outputs On Analog Channels	19	VIDEO_OUT	(3.15V)
	20	Shield	

MAIN PWB
Tuner Location

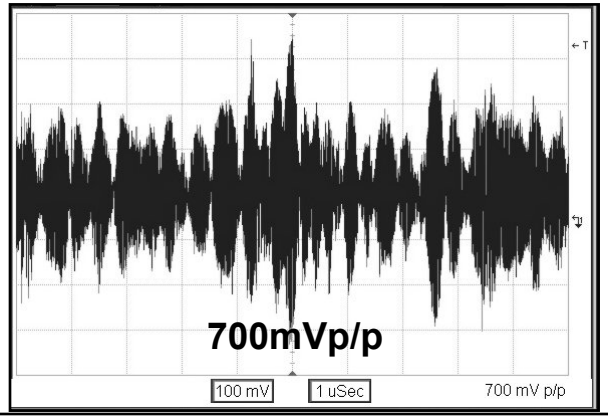
Pin 19 "Video" Signal



Pin 16 "SIF" Signal



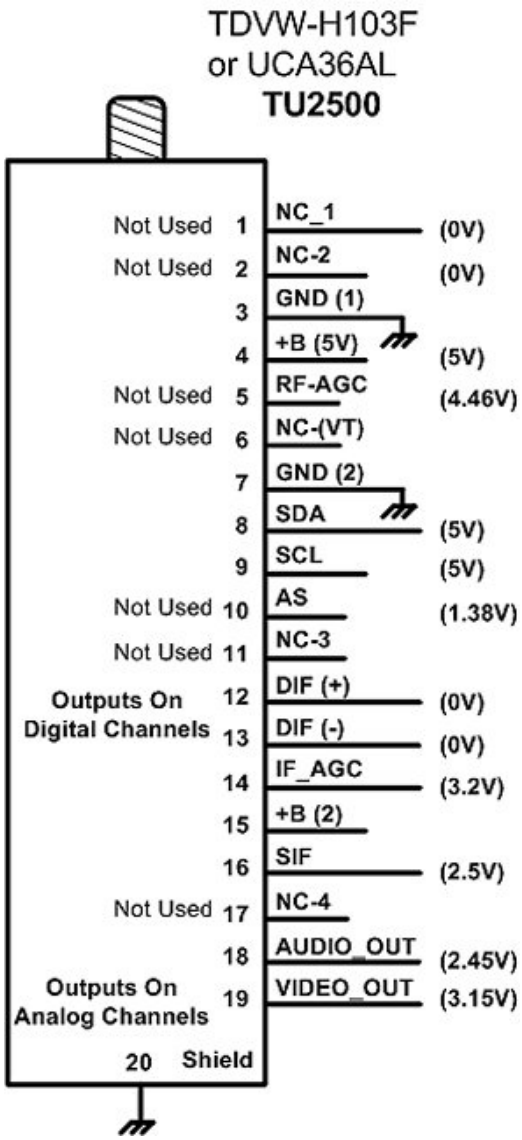
Pin 12 and Pin 13 "Dig IF" Signal



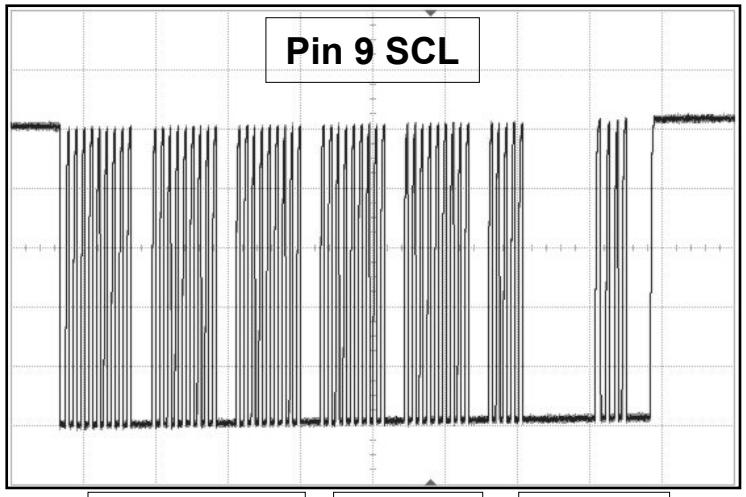
Note: "Video Out" Signal only when receiving an analog Channel.

Note:
"Dig IF" Signal only when receiving a Digital Channel.

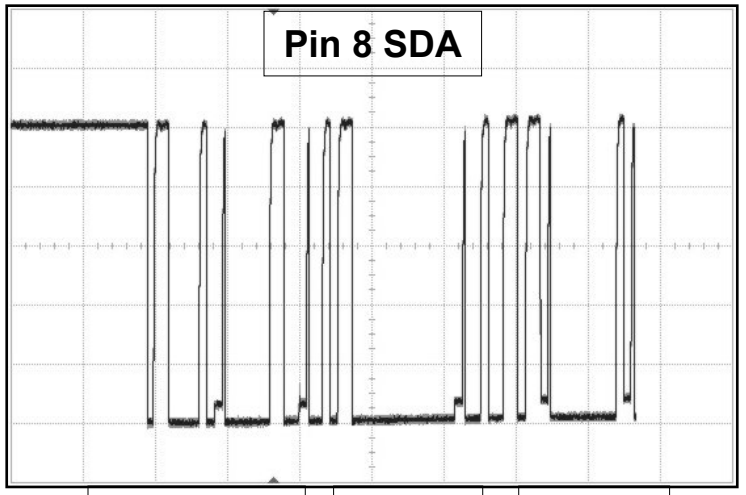
Main PWB Tuner Clock and Data Lines



Note:
SCL and SDA only active during an actual Channel Change.



1V per/div | 100uS | 5V p/p

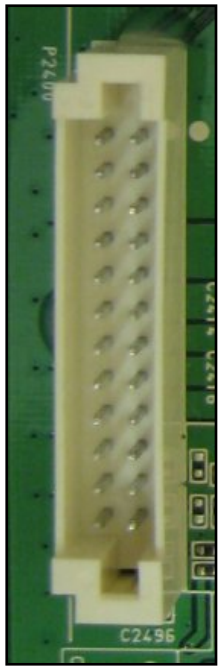


1V per/div | 100uS | 5V p/p

Main PWB Connector P2400 to Power Supply Voltage and Diode Check

P2400 "Main PWB" to P201 "SMPS PWB"

P2400



Odd Pins

Pin	Label	STBY	Run	Diode Check
1	nc	nc	nc	nc
3	Gnd	Gnd	Gnd	Gnd
5	Gnd	Gnd	Gnd	Gnd
7	5V	5.06V	5.06V	1.54V
9	5V	5.06V	5.06V	1.54V
11	Gnd	Gnd	Gnd	Gnd
13	12V	0V	12.3V	Open
15	Gnd	Gnd	Gnd	Gnd
17	24V	0V	21.4V	Open
19	nc	nc	nc	nc
21	[1]A.DIM	0V	1.75V	Open
23	nc	nc	nc	nc

Even Pins

Pin	Label	STBY	Run	Diode Check
2	PWR-ON	0V	4.5V	Open
4	Gnd	Gnd	Gnd	Gnd
6	Gnd	Gnd	Gnd	Gnd
8	5V	5.06V	5.06V	1.54V
10	5V	5.06V	5.06V	1.54V
12	Gnd	Gnd	Gnd	Gnd
14	12V	0V	12.3V	Open
16	Gnd	Gnd	Gnd	Gnd
18	24V	0V	21.4V	Open
20	Inv.Out	0V	4.5V	2.2V
22	Err Out	0V	0V	1.23V
24	[2]PWM-DIM	0V	3.3V	Open

[1]ADIM Pin 21 Fixed and not used

[2]PDIM Pin 24 can vary according to type of signal being processed, OSD Backlight setting. 0.6V 0% to 3.3V 100% and the Intelligent Sensor. Output from the Video Processor IC100.

Diode Mode values taken with all Connectors Removed

Main PWB Connector P1100 to the T-CON Voltage and Diode Check

P1100 CONNECTOR "Main" to CN1 "T-CON"

Diode Mode values taken with all Connectors Removed

Pin	Label	Run	Diode Test
1	**LVDS 12V**	**12V**	**Open**
2	**LVDS 12V**	**12V**	**Open**
3	**LVDS 12V**	**12V**	**Open**
4	**LVDS 12V**	**12V**	**Open**
5	n/c	n/c	n/c
6	Gnd	Gnd	Gnd
7	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd
9	Gnd	Gnd	Gnd
10	Gnd	Gnd	Gnd
11	URSA-B4M	1.09V	1.23V
12	URSA-B4P	1.44V	0.875V
13	URSA-B3M	1.09V	1.23V
14	URSA-B3P	1.44V	1.23V
15	Gnd	Gnd	Gnd
16	URSA-BCKM	1.22V	1.14V
17	URSA-BCKP	1.21V	1.25V
18	Gnd	Gnd	Gnd
19	URSA-B2M	1.13V	1.23V
20	URSA-B2P	1.4V	0.87V

Pin	Label	Run	Diode Test
21	URSA-B1M	1.1V	0.87V
22	URSA-B1P	1.4V	1.2V
23	URSA-B0M	1.1V	1.22V
24	URSA-B0P	1.4V	O0.88V
25	n/c	n/c	n/c
26	Gnd	Gnd	Gnd
27	URSA-A4M	1.1V	0.87V
28	URSA-A4P	1.4V	1.23V
29	URSA-A3M	1.1V	1.23V
30	URSA-A3P	1.4V	1.23V
31	Gnd	Gnd	Gnd
32	URSA-ACKM	1.26V	1.20V
33	URSA-ACKP	1.25V	1.2V
34	Gnd	Gnd	Gnd
35	URSA-A2M	1.4V	0.88V
36	URSA-A2P	1.4V	1.22V
37	URSA-A1M	1.2V	1.11V
38	URSA-A1P	1.3V	1.23V
39	URSA-A0M	1.2V	1.18V
40	URSA-A0P	1.3V	1.05V

Pin	Label	Run	Diode Test
41	OPC-Out2	n/c	Open
42	OPC-EN	0.7V	1.09V
43	OPC-Out	3.3V	Open
44	*PWM-DIM	3.3V	Open
45	LVDS-Sel	0V	Gnd
46	n/c	n/c	n/c
47	n/c	n/c	n/c
48	n/c	n/c	n/c
49	n/c	n/c	n/c
50	n/c	n/c	n/c
51	Gnd	Gnd	Gnd

PWM-DIM (Pin 44) is not used by the T-CON PWB.

Main PWB Connector P1101 to the T-CON PWB Voltage and Diode Check

P1101 CONNECTOR "Main" to CN2 “T-CON"

Pin	Label	Run	Diode Test
1	Gnd	Gnd	Gnd
2	Gnd	Gnd	Gnd
3	URSA-D4M	1.15V	1.18V
4	URSA-D4P	1.4V	1.24V
5	URSA-D3M	1.25V	0.87V
6	URSA-D3P	1.3V	1.12V
7	Gnd	Gnd	Gnd
8	URSA-DCKM	1.29V	1.22V
9	URSA-DCKP	1.3V	1.23V
10	Gnd	Gnd	Gnd
11	URSA-D2M	1.2V	0.87V
12	URSA-D2P	1.3V	0.87V
13	URSA-D1M	1.3V	1.23V
14	URSA-D1P	1.29V	0.87V
15	URSA-D0M	1.25V	1.23V
16	URSA-D0P	1.29V	0.87V
17	Gnd	Gnd	Gnd
18	Gnd	Gnd	Gnd
19	URSA-C4M	1.18V	1.08V
20	URSA-C4P	1.13V	1.07V

Pin	Label	Run	Diode Test
21	URSA-C3M	1.2V	1.2V
22	URSA-C3P	1.3V	1.23V
23	Gnd	Gnd	Gnd
24	URSA-C2M	1.3V	0.87V
25	URSA-C2P	1.23V	0.87V
26	Gnd	Gnd	Gnd
27	URSA-C2M	1.2V	1.03V
28	URSA-C2P	1.3V	0.87V
29	URSA-C1M	1.2V	0.87V
30	URSA-C1P	1.3V	1.23V
31	URSA-C0M	1.2V	1.20V
32	URSA-C0P	1.28V	0.87V
33	Gnd	Gnd	Gnd
34	n/c	n/c	n/c
35	n/c	n/c	n/c
36	n/c	n/c	n/c
37	n/c	n/c	n/c
38	n/c	n/c	n/c
39	n/c	n/c	n/c
40	n/c	n/c	n/c
41	n/c	n/c	n/c

Diode Mode values taken with all Connectors Removed

Main PWB Connector P3400 to (Ft. IR/LED Control) Voltage and Diode Check

P3400 CONNECTOR "MAIN PWB" to P1 "Front IR / LED PWB Assy"

Pin	Label	STBY	Run	Diode Check
1	**SCL**	3.3V	3.3V	Open
2	**SDA**	3.3V	3.3V	Open
3	**Gnd**	Gnd	Gnd	Gnd
4	**Key1**	3.3V	3.3V	1.91V
5	**Key2**	3.3V	3.3V	1.91V
6	**5V ST**	**5.05V**	**5.05V**	**1.5V**
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	**IR**	2.69V	2.69V	1.3V
10	Gnd	Gnd	Gnd	Gnd
11	**3.3V_ST**	3.29V	3.3V	**0.69V**
12	**LED On/Off**	0V	3.3V	Open

Diode Mode values taken with all Connectors Removed

Main PWB Connector P2300 to Speakers Voltage and Diode Check

P2300 CONNECTOR "Main" to "Speakers"

Pin	LABEL	SBY	Run	Diode Check
1	SPK-R (-)	0V	10.7V	Open
2	SPK-R (+)	0V	10.7V	Open
3	SPK-L (-)	0V	10.7V	Open
4	SPK-L (+)	0V	10.7V	Open

Use speaker out to test for defective Audio Amp IC2301

Diode Mode values taken with all Connectors Removed

FRONT CONTROL (IR, INTELLIGENT SENSOR and KEY BOARD) SECTION

The Front Control PWB (located on the bottom left as viewed from the rear) contains the IR (Infrared Remote Sensor) and the Intelligent Sensor plus the front Power LEDs.
This board also connects with the Side Key PWB.

This board receives it operating B+ via pin 6 (STBY 5V) and pin 11 (STBY 3.3V) on connector P1.
It is received from the Main PWB via the connector P1200.

The Intelligent Sensor communicates with the Video Processor IC100 via clock and data lines on the same connector pins 1 and 2.

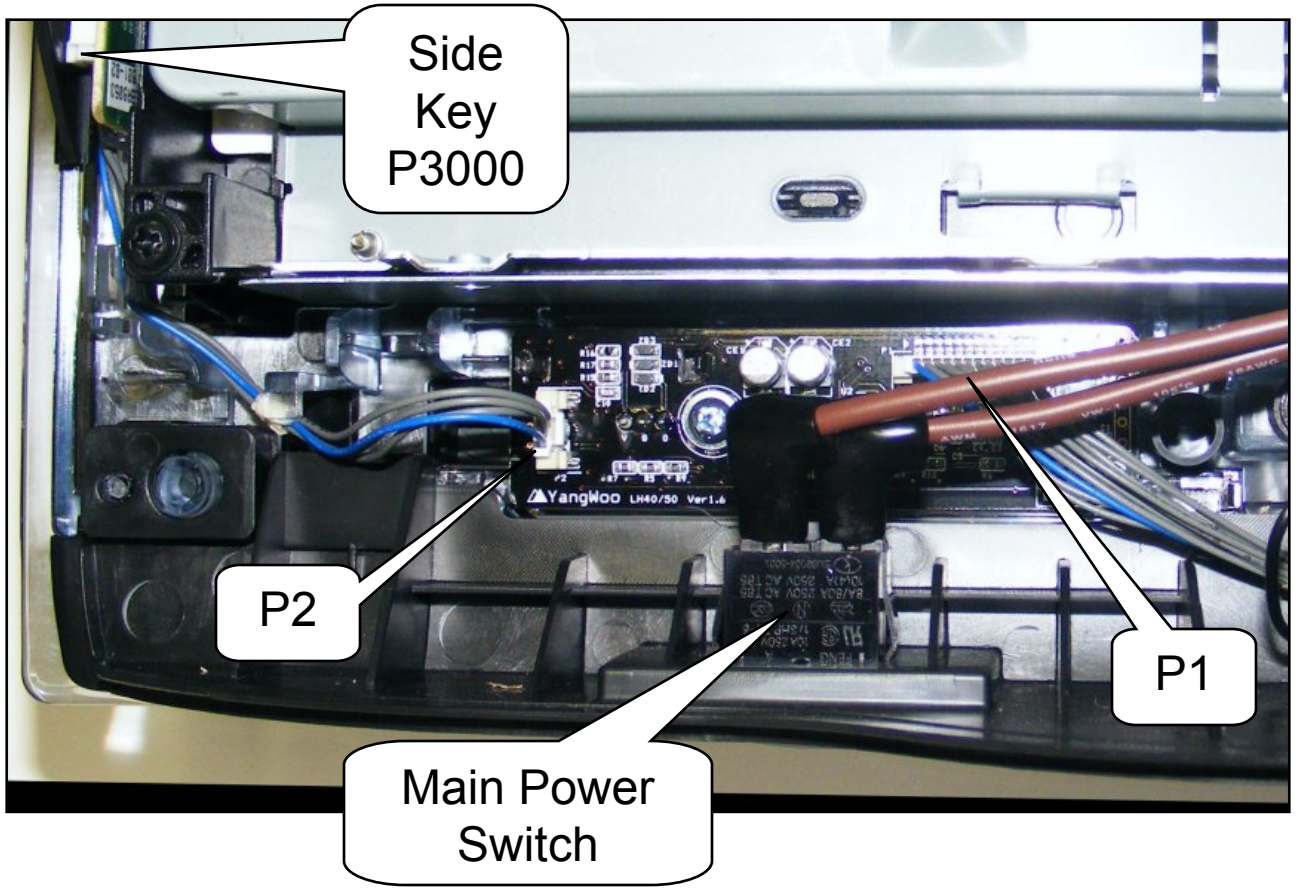
The IR pulses (5V p/p) are sent to the Microprocessor (same IC100) via pin 9.

The Key board connector P3000 is routed to the Ft control board via P2. Then through the front Control board and out P2 to P1200 pins 4 and 5 and then to the Microprocessor.

Finally, the front Power LEDs are controlled by P1 connector pin 12 and pin 8.

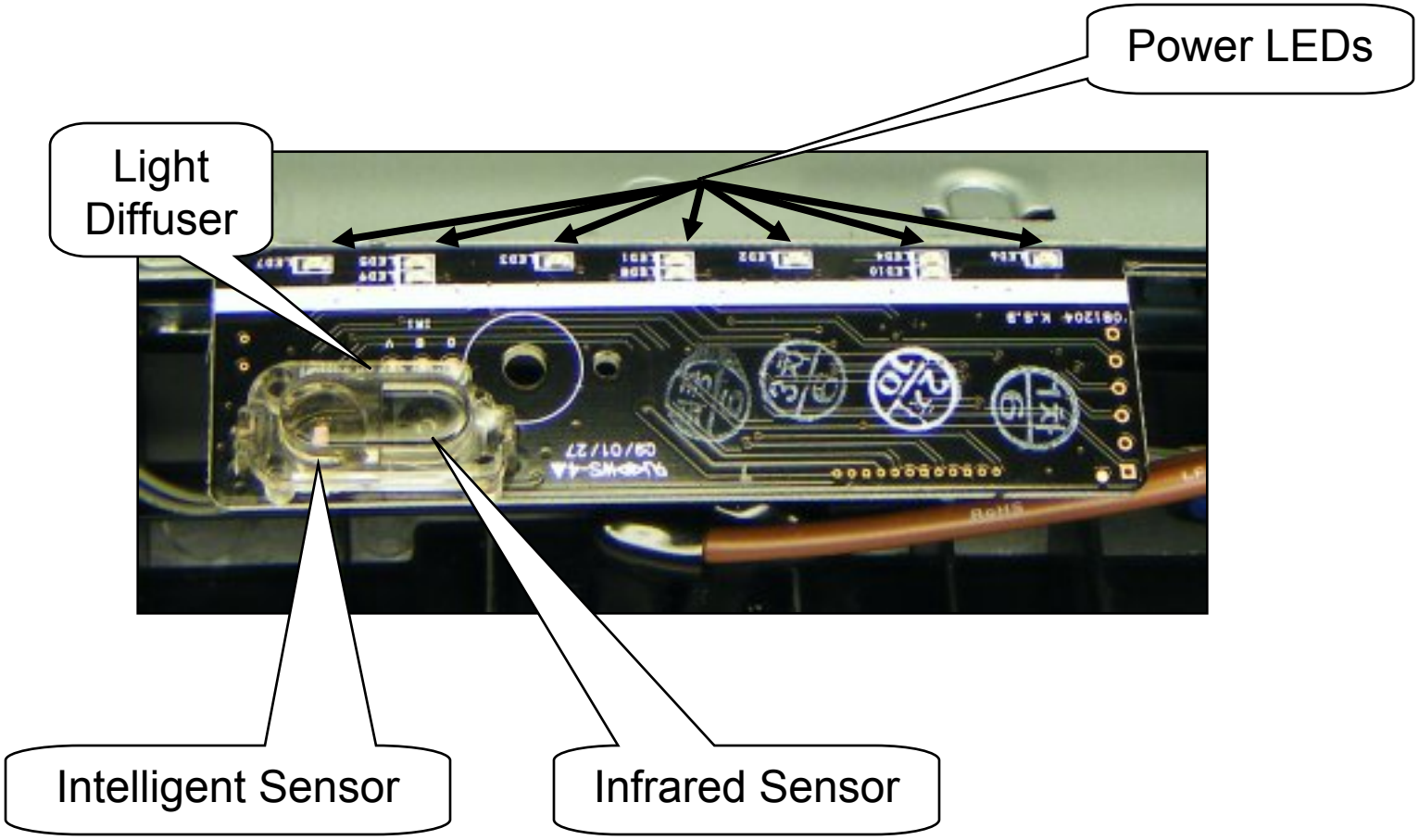
FRONT CONTROL BOARD CONNECTIONS IDENTIFIED

The below picture shows the connections to the Front Control board. p/n EBR59216901



FRONT CONTROL (IR and INTELLIGENT SENSOR) IDENTIFIED

The Front Control PWB (located on the bottom left as viewed from the rear) contains the IR (Infrared Remote Sensor) and the Intelligent Sensor plus the front Power LEDs.



Ft. IR / LED Control Connector P1 and P2 Voltage and Diode Check

P1 CONNECTOR "Front IR / LED PWB Assembly" to P3400 "MAIN PWB"

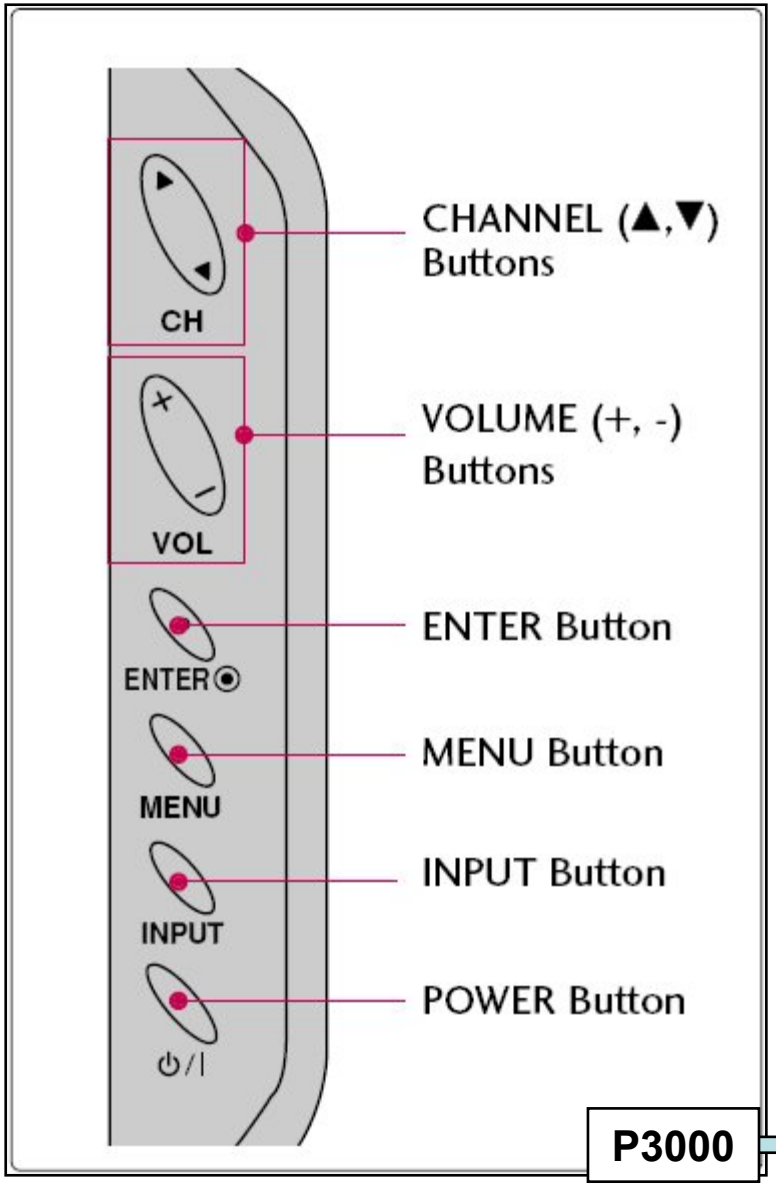
Pin	Label	STBY	Run	Diode Check
1	SCL	3.3V	3.3V	Open
2	SDA	3.3V	3.3V	Open
3	Gnd	Gnd	Gnd	Gnd
4	Key1	3.3V	3.3V	Open
5	Key2	3.3V	3.3V	Open
6	5V ST	5.05V	5.05V	1.13V
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	IR	2.67V	2.67V	Open
10	Gnd	Gnd	Gnd	Gnd
11	3.3V_ST	3.29V	3.3V	Open
12	LED On/Off	0V	3.3V	Open

P2 Connector to "Side Key" P1

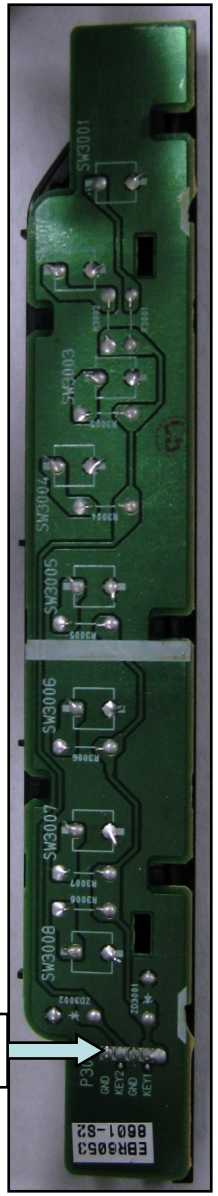
Pin	Label	STBY	Run	Diode Check
1	Key 1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key 2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

Diode Mode values taken with all Connectors Removed

Side Key Assembly



SW3001
SW3002
SW3003
SW3004
SW3005
SW3006
SW3007
SW3008

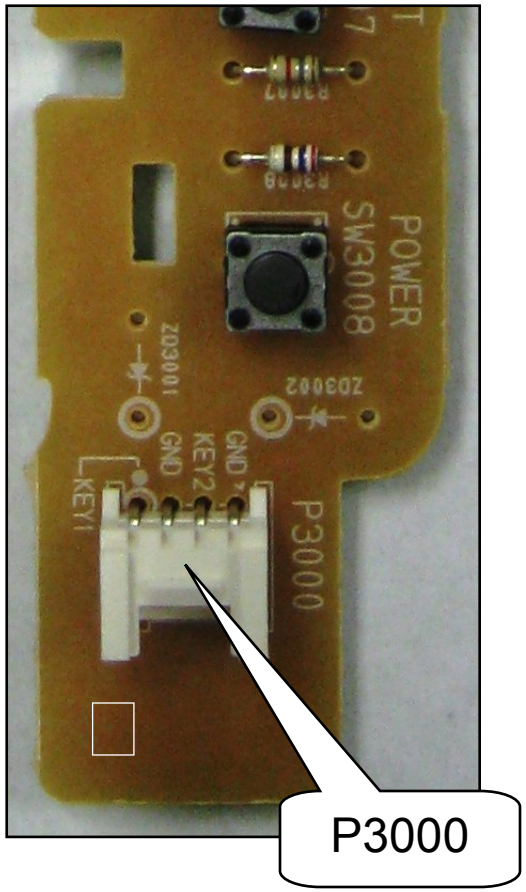


P3000

P3000

To Ft Control

Side Key Assembly P3000 Voltage and Diode Check



P3000 Resistance Measurements with Key pressed.

KEY	Pin 1 measured from Gnd		KEY	Pin 3 measured from Gnd
Power	270.5 Ohms		Volume (-)	270.5 Ohms
Input	1.8K Ohms		Volume (+)	1.8K Ohms
Menu	4.8K Ohms		CH (Dn)	4.8K Ohms
Enter	10K Ohms		CH (Up)	10K Ohms

P3000 Voltage Measurements with Key pressed.

KEY	Pin 1 measured from Gnd		KEY	Pin 3 measured from Gnd
Power	0.179V		Volume (-)	0.179V
Input	0.906V		Volume (+)	0.906V
Menu	1.65V		CH (Dn)	1.65V
Enter	2.24V		CH (Up)	2.24V

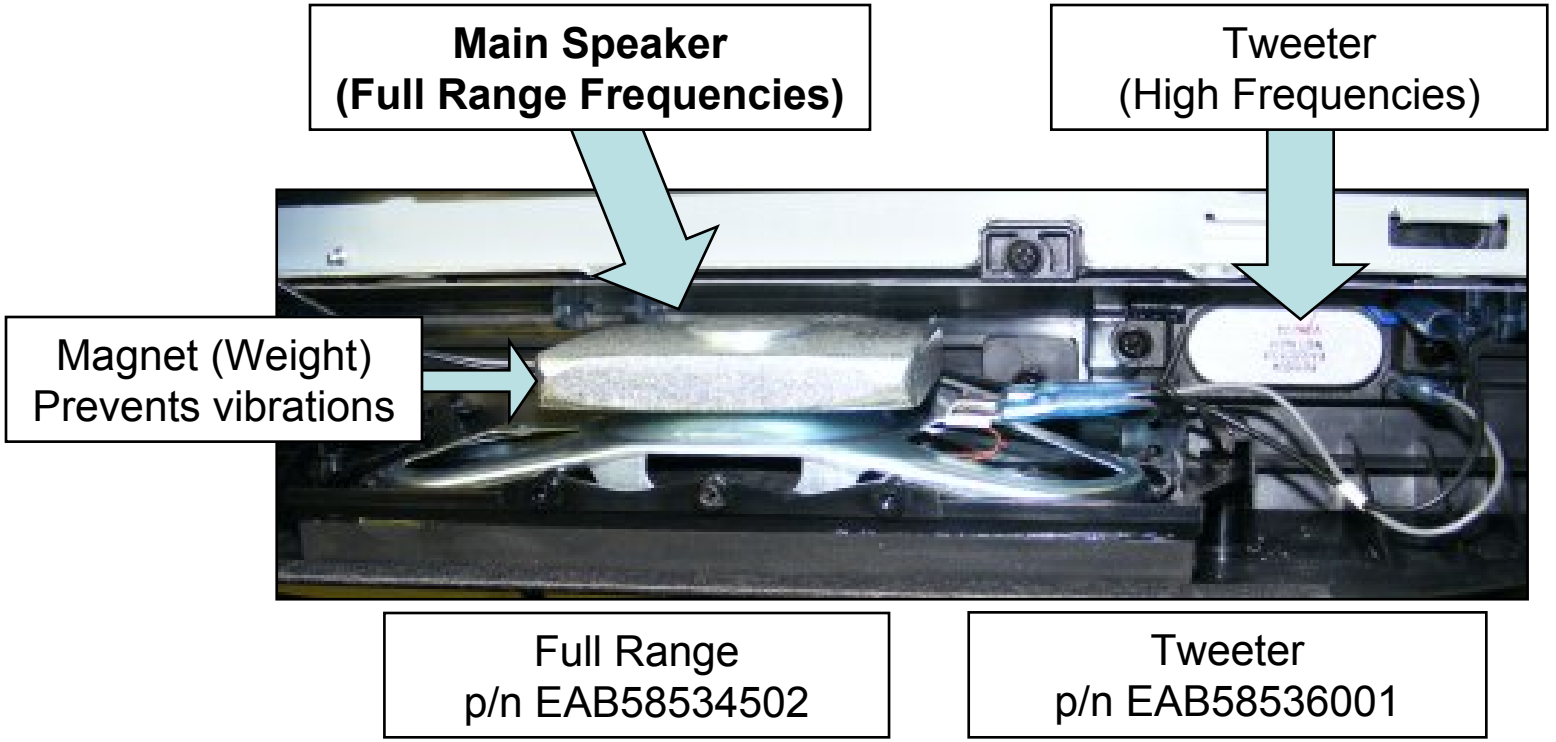
P3000 Connector "Side Key" to "IR/LED Control

Pin	Label	STBY	Run	Diode Check
1	Key1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

The following section covers the Speakers used in the 42LH50

Invisible Speaker System Overview (Full Range Speakers)

The 42LH50 contains the full progression of the Invisible Speaker system. First: The woofer layout is the basic system. The Full Range Speakers point downward, so there is no front viewable speaker grill or air ports.



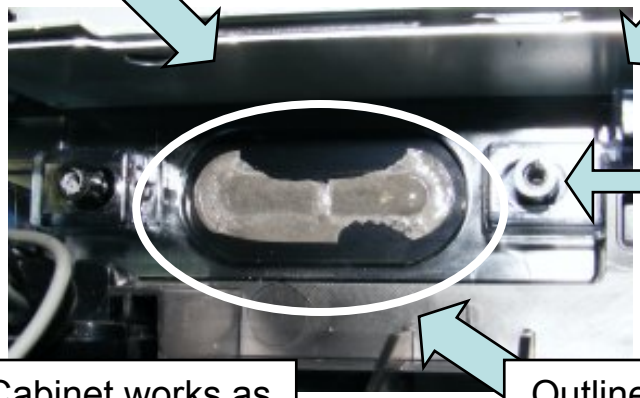
Invisible Speaker System Overview (Tweeters) and Warning

2nd: Progression Elimination of the conventional speaker.

Invisible Speaker has a sticky surface which adheres to front bezel.

WARNING: Removing the Tweeter will destroy the speaker as shown above. The diaphragm/spider is glued to the front bezel. When removing, it will tear.

The front bezel is shown below. Note: the outlined circle is the location for the front sticky pad on the Invisible Speaker. (Some remained)
This prevent the coil from bouncing off the plastic causing vibrations.

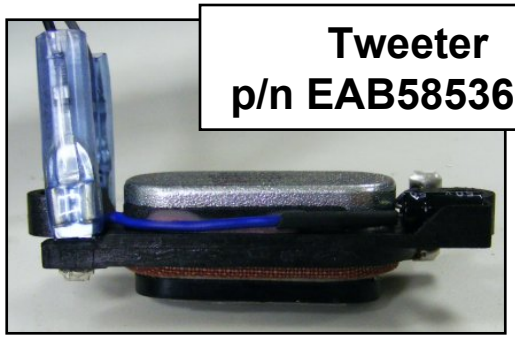


Speaker Attachment post

Cabinet works as a diaphragm.

Outlined Circle

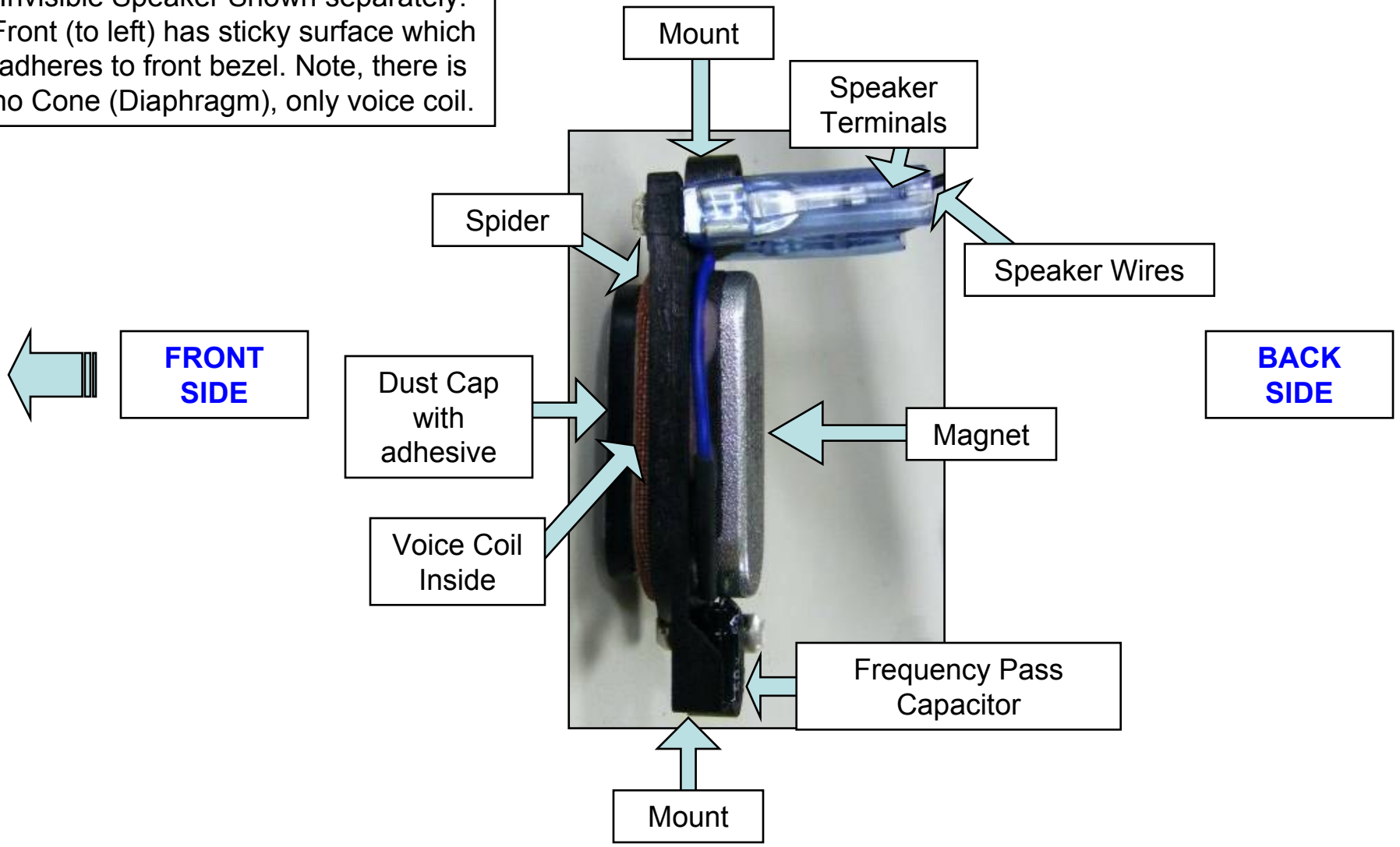
Tweeter p/n EAB58536001



Invisible Speaker Tweeter shown separately. The Front (down) has sticky surface which adheres to front bezel. Note, there is no diaphragm, only voice coil.

Invisible Speaker System Overview

Invisible Speaker Shown separately. Front (to left) has sticky surface which adheres to front bezel. Note, there is no Cone (Diaphragm), only voice coil.



11 X 17 FOLDOUT SECTION

This section shows the 11X17 foldout that's available in the Paper and Adobe version of the Training Manual.

The Adobe version of this Training Manual allows the viewer to zoom in and out making reading of the small text easier.
This Power Point shows a graphical representation of the 11 X 17 foldout page so clarity is limited.

42LH50 INTERCONNECT DIAGRAM

P201 "SMPS" to P2400 "Main PWB"

Pin	Label	STBY	Run	Diode Check
24	[2] PDIM	0V	3.2V	Open
23	nc	nc	nc	nc
22	Err Out	0V	0V	Open
21	[1] A.DIM	0V	1.66V	Open
20	INV.ON	0V	3.8V	2.25V
19	nc	nc	nc	nc
17,18	24V	0V	21.4V	0.81V
15,16	Gnd	Gnd	Gnd	Gnd
13,14	12V	0V	12.3V	1.2V
11,12	Gnd	Gnd	Gnd	Gnd
7,8,9,10	5V	5.14V	5.14V	2.85V
3,4,5,6	Gnd	Gnd	Gnd	Gnd
2	PWR-On	0V	4.98V	1.19V
1	nc	nc	nc	nc

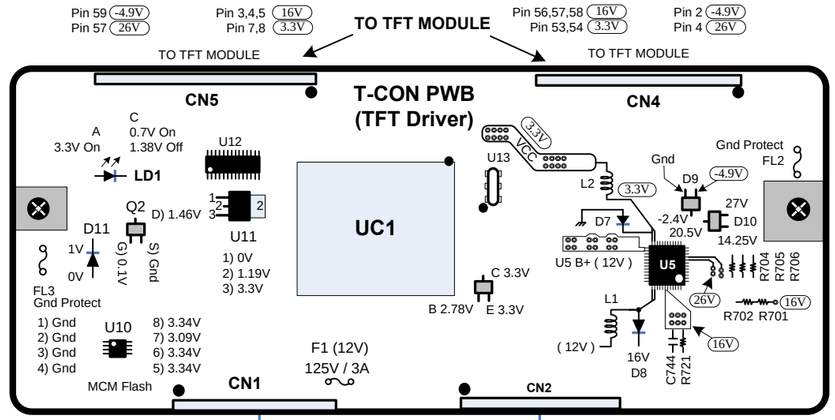
[1] ADIM Pin 21 Fixed and not used

[2] PDIM Pin 24 can vary according to type of signal being processed and the OSD Backlight setting. 0.6V 0% to 3.3V 100%. Output from the BCM chip.

UC1 drives Q2 which drives LD1 to assist the backlights during start up.

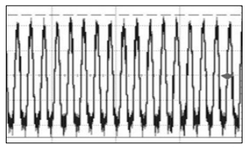
Stby = Off
Both Anode / Cathode 0V

On
Anode 3.3V Cathode 0.7V
30 Seconds later
Off
Anode 3.3V Cathode 1.38V



P2400 "Main PWB" to P201 "SMPS"
For Voltages see P201

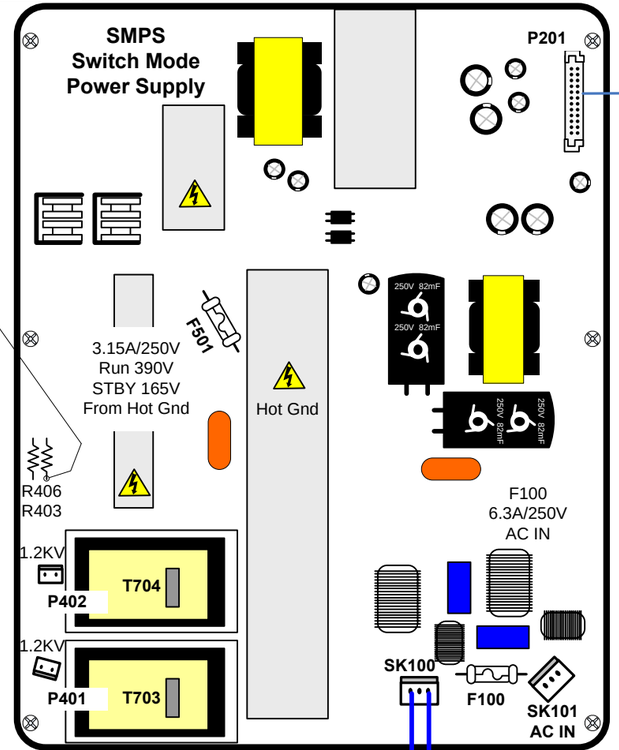
Diode Check	
24	Open
23	nc
22	Open
21	Open
20	Open
19	nc
17,18	Open
15,16	Gnd
13,14	Open
11,12	Gnd
7,8,9,10	Open
3,4,5,6	Gnd
2	Open
1	nc



R406 / R403
Bottom leg
48Khz
53V p/p

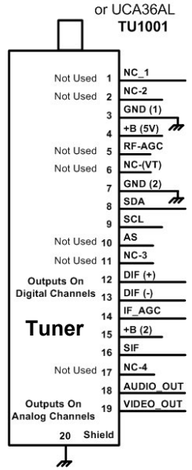
P3400 CONNECTOR "MAIN PWB" to J1 "Front IR / LED PWB

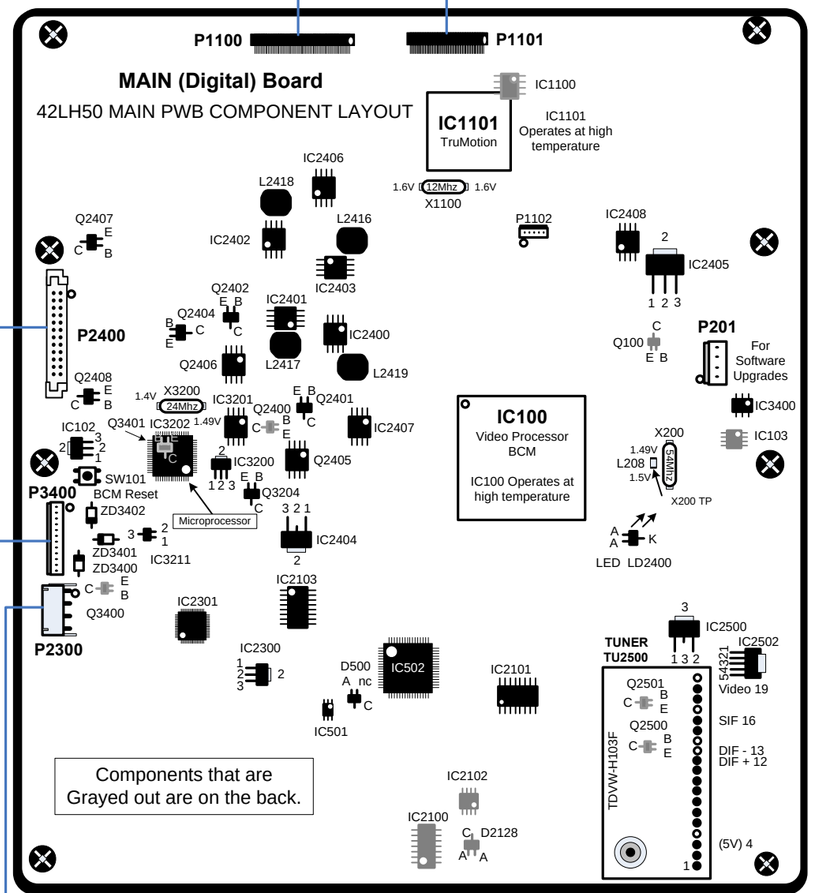
Pin	Label	STBY	Run	Diode Check
1	SCL	3.3V	3.3V	Open
2	SDA	3.3V	3.3V	1.67V
3	Gnd	Gnd	Gnd	Gnd
4	Key1	3.3V	3.3V	1.4V
5	Key2	3.3V	3.3V	1.1V
6	5V ST	5.1V	5.1V	1.5V
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	IR	4.8V	4.8V	Open
10	Gnd	Gnd	Gnd	Gnd
11	3.3V_ST	3.29V	3.29V	0.76V
12	POWER On/Off	0V	3.29V	Open

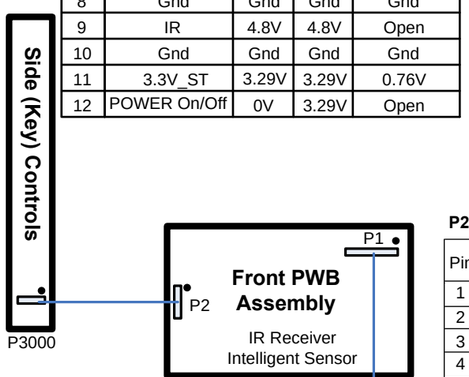


SMPS TEST 1: To Force Power Supply On. Disconnect P700 on Main PWB. Jump pin 7,8,9 or 10 (5V) to pin 2 using a 100Ω resistor. (Test Voltage Outputs 12V, and 24V).

SMPS TEST 2: Jump pin 2 to pin 20 (INV-ON). (Backlights and all voltages should turn on).







P2 "Front IR / LED PWB to P3000 Keys

Pin	Label	STBY	Run	Diode Check
1	Key1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

42LH50 MAIN (FRONT SIDE) SIMICONDUCTORS

IC102 BCM Reset

Pin	
1	3.3V
2	Gnd
3	3.29V

IC2101 RGB

Pin	Sync
[1]	1.9V
[2]	1.9V
[3]	4.38V
[4]	1.9V
[5]	1.9V
[6]	4.5V
[7]	Gnd
[8]	n/c
[9]	1.9V
[10]	1.9V
[11]	4.38V
[12]	1.9V
[13]	1.9V
[14]	5V

IC2300 1.8V Amp

Pin	Audio
1	Gnd
2	1.8V
3	3.3V

IC2103 RS232

Pin	Rx/Tx
[1]	3.25V
[2]	3.27V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	n/c
[8]	Gnd
[9]	Gnd
[10]	4.76V
[11]	4.76V
[12]	3.17V
[13]	3.3V
[14]	3.3V
[15]	3.3V
[16]	5V

IC2400 1.2V Core

Pin	
[1]	Gnd
[2]	5V
[3]	Gnd
[4]	0.8V
[5]	0.9V
[6]	3.23V
[7] [8]	1.2V

IC2401 5V USB

Pin	Fan
[1]	0V
[2]	12V
[3]	Gnd
[4]	0.8V
[5]	0.8V
[6]	5V
[7]	5V
[8]	5V

IC2402 1.8V-MEMC

Pin	
[1]	Gnd
[2]	5V
[3]	Gnd
[4]	0.8V
[5]	1V
[6]	4.98V
[7]	1.89V
[8]	1.89V

IC2403 3.3V/A3.3V

Pin	Reg
[1]	Gnd
[2]	12V
[3]	Gnd
[4]	0.8V
[5]	0.9V
[6]	3.23V
[7]	3.37V
[8]	3.37V

IC2404 3.3V-ST

Pin	3.3V-VDDP-ST
1	Gnd
2	3.3V
3	5V

IC2405 1.8V-DDR

Pin	Reg
[1]	0.58V
[2]	1.8V
[3]	3.3V

IC2406 1.26V-MEMC

Pin	Reg
[1]	n/c
[2]	1.87V
[3]	1.87V
[4]	n/c
[5]	n/c
[6]	1.27V
[7]	0.8V
[8]	Gnd

IC2407 A2.5V Reg

Pin	
[1]	n/c
[2]	3.23V
[3]	3.3V
[4]	n/c
[5]	n/c
[6]	2.53V
[7]	0.53V
[8]	Gnd

IC2408 1.8V-DDR

Pin	Reg
[1]	Gnd
[2]	3.3V
[3]	0.89V
[4]	0.9V
[5]	1.8V
[6]	3.3V
[7]	1.8V
[8]	0.89V

IC2500 9V Reg

Pin	for Tuner
[1]	12.3V
[2]	8.9V
[3]	Gnd

IC2502 5V Reg

Pin	for Tuner
[1]	8.98V
[2]	1.9V
[3]	5V
[4]	0V
[5]	0V

IC3200 Micro Reset

Pin	
[1]	3.3V
[2]	Gnd
[3]	0.6V

IC3201 uP EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	3.29V
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	0V
[8]	3.3V

IC3211 Power Det

Pin	
[1]	Gnd
[2]	3.3V
[3]	3.36V

IC3400 USB 5V

Pin	
[1]	5V
[2]	0V
[3]	3.3V
[4]	3.3V
[5]	0V
[6]	5V

IC501 HDMI Remote

Pin	
[1]	3.3V
[2]	3.3V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	3.19V

Q2401 24V PWR Sw

Pin	Q2405
B	0.59V
C	0V
E	0V

Q2402 5V Sw Ctl

Pin	Q2406
B	0.59V
C	0V
E	0V

Q2404 LVDS Sw Ctl

Pin	Q2406
B	0.59V
C	0V
E	0V

Q2405 24V PWR / 12V PWR

Pin	
[1]	21.28V
[2]	12.31V
[3]	12.31V
[4]	6V
[5]	12.31V
[6]	12.31V
[7]	21.28V
[8]	21.28V

Q2406 5V and LVDS 12V Switch

Pin	
[1]	5V
[2]	0.2V
[3]	12.3V
[4]	6V
[5]	12.3V
[6]	12.3V
[7]	5V
[8]	5V

Q2407 POW On/Off2

Pin	
B	3.37V
C	4.7V
E	5V

Q2408 INV Ctl

Pin	
B	0V
C	4.55V
E	0V

Q3204 Micro Reset Sw.

Pin	
B	0.59V
C	0V
E	0V

D500 IC501 shunt

Pin	
A1	0V
C	3.1V
A2	3.29V

LD2400 A3.3V OK

Pin	
A1	n/c
C	Gnd
A2	1.62V

ZD3400 IR Clamp

Pin	
C	2.68V
A	Gnd

ZD3401 Key2 Clamp

Pin	
C	3.3V
A	Gnd

ZD3402 Key1 Clamp

Pin	
A	Gnd
C	3.3V

42LH50 MAIN (BACK SIDE) SIMICONDUCTORS

IC103 BCM EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	Gnd
[8]	3.3V

IC1100 SPI Flash

Pin	
[1]	0V
[2]	1.4V
[3]	3.3V
[4]	Gnd
[5]	0V
[6]	0.34V
[7]	3.3V
[8]	3.3V

IC2102 RGB EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3V
[6]	3.7V
[7]	4.8V
[8]	4.49V

D2128 5V to IC2102

Pin	
A1	5V
C	4.5V
A2	0V

IC2100 RS232

Pin	Rx/Tx
[1]	3.3V
[2]	5.4V
[3]	0V
[4]	0V
[5]	(-5V)
[6]	(-5V)
[7]	(-5V)
[8]	0V
[9]	3.29V
[10]	3V
[11]	n/c
[12]	n/c
[13]	0V
[14]	5.4V
[15]	Gnd
[16]	3.3V

Q100 IC101 Flash

Pin	Write Protect
B	0V
C	3.3V
E	0V

Q2400 12V PWR Ctl

Pin	Q2405
B	0V
C	0V
B	0.778V

Q2500 Tuner SIF

Pin	Buffer
B	0.898V
C	0V
E	0.246

Q2501 Tuner Video

Pin	Buffer
B	3.4V
C	0V
E	2.79V

Q3400 LED PWR On

Pin	
B	0V
C	3.3V
E	0V

Q3401 EDID WP

Pin	
B	0V
C	4.8V
E	0V